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ABSTRACT

A project was conducted in North Carolina to identify science competencies in three selected vocational programs: consumer and homemaking education, business and office education, and marketing and distributive education; to develop subcompetencies to reflect the science skills implied in the identified competencies; to validate the subcompetencies; and to develop training and dissemination activities related to the competencies. An advisory committee was formed and chose 12 teachers (6 science teachers and 2 each from the 3 vocational areas) to participate in the project. The 12 teachers met with a leader for two day-long sessions at East Carolina University to identify vocational competencies that require science skills, to develop subcompetencies, and to develop a matrix of science competencies identified in the vocational competencies. The materials were subsequently validated by a sample of 469 students, parents, teachers, and business persons, who agreed strongly that the revised programs included a great deal of science content. Besides a description of the project, this paper includes (1) a list of vocational competencies that have been identified as having science skills associated with specific tasks/outcomes performed in each of the vocational courses, (2) subcompetencies for each competency statement identified as having implied science content, (3) a matrix that illustrates the required science skills for each of the selected vocational courses, and (4) an annotated bibliography of selected references and curriculum materials. (KC)

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SCIENCE COMPETENCIES IN VOCATIONAL EDUCATION

Business and Office Education

Consumer and Homemaking Education

Marketing and Distributive Education

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INTRODUCTION

Mathematics and science are presently enjoying a relatively strong position in the hierarchy of education priority. This is a direct result of the recurring interest in basic skills shown by the public, mass media, governmental agencies and special commissions which have assessed the status of education in our society today. There is a general feeling in the United States that students are having difficulty in the basic skill areas of communication, science and mathematics. The decline in test scores by youth is seen as evidence of this difficulty. These test scores and other indicators tend to support the widespread belief that young people are graduating from high school without adequate reading, writing, problem-solving and mathematics skills (Smith, 1981). If this is true and information from national studies is accurate, the status position that the United States has held in technology may begin to slip embarrassingly and dangerously, challenging the country's ability to survive as a leader in this crucial area (Wirszup, 1984).

The evident problem coupled with public interest has prompted the educational community to give more attention to the study of basic skills including science and mathematics education. Educators at all levels are attempting to include mathematics and science in their educational programs (Truxal, 1984).

All of the interest and attention is both timely and well deserved, for mathematics and science education is education for living. Although these subjects have long been considered mainly for the "academically elite," we are now beginning to realize that they are also an important part of the practical education needed by all students. Subsequently, mathematics and science should be accepted as basic academic skills, skills essential for optimum efficiency in carrying out social, consumer, economic and occupational responsibilities required of today's citizenry. It follows that educational institutions should be expected to provide broad and sequential experiences to

help learners develop the basic computational and scientific skills needed to function in an advanced technological society (Long, 1980).

The acquisition of mathematics and science-related skills is highly related to subsequent vocation development. Some authors (Evans, 1973; Long, 1980; Mangum, 1975; Smith, 1981; and Snydam, 1976) suggest that science and "mathematics instruction, among other things, should be basic to, supportive of, and allied with curriculum directed toward the development of vocational and occupational specialties" (Long, 1980, p. 1). Thus, the twofold purpose of this project was to design and implement a program to assess the science skills included in selected vocational education programs in North Carolina and to develop competency statements which will reflect these skills.

Significance of the Study

Many students have a general fear of mathematics and science. Contributing to this fear is the perception that mathematics and science are inherently difficult and boring. Most students do not take a science or mathematics course after the tenth grade (Long, 1980). Sigda (1983) reports that elementary children now spend less than one out of 25 hours per week in science instruction, and only one in six juniors and seniors now take any science course in high school. Yet many individuals believe we are living in a society of increasing complexity in which the need for mathematics and science skills is growing, not decreasing (Wirszup, 1984). Consequently the youth of today are being urged to remain in school to achieve the competencies which will be needed in an advanced and technologically sophisticated world. Paul Hurd (1984) said that "what has been missing from science courses, and is essential for scientific and technological literacy, is how to make use of information already discovered" (22).

As a more diverse population of students is introduced to more indepth mathematics and science instruction, the need for an improved and different method of presenting this information may become even more evident. The

Educational Commission of the States (cited in Secondary Vocational Education's Math and Science Contribution, 1982) in the report, "Education for a High Technology Economy," concluded that to achieve educational excellence, the emphasis on improvement of mathematics and science must be at all levels and in all programs in the educational system. The Commission further argued that "...it is essential that more opportunities be provided for acquiring in-depth information and 'hands-on' experience with the problems and the possible solutions" (p. 2). In fact, it would seem that the appeal of science may be increased, and fear or apathy may be remitted by demonstrating the relevance of science subject matter to practical, everyday application in the marketplace and world of work (Long, 1980; Truxal, 1984).

There appears to be a number of factors operating to make vocational education one of the best arenas for the rapid development of communication, mathematics and science skills. First, it seems that the public is becoming more receptive to the importance of the vocational experience. In a 1984 Gallup Poll survey (cited in The National Commission on Secondary Vocational Education) of the public's attitude toward public schools, eighty-three percent of the respondents thought vocational education should be required for students not planning to attend college. This was about a twenty percent increase over a 1981 survey. Thirty-three percent felt students going to college should also be required to take a vocational course. In discussing this issue, Gene Bottoms (1984) of the American Vocational Association emphasized that in the context of education, "vocational education becomes an alternative approach to learning, one that allows students to use their academic knowledge and skills to master the practices in an occupational area. It can do for many students what the college-bound curriculum does for the student who plans to be a mathematician, a scientist, or an engineer" (p. 11). The Education Commission of the States confirmed this position in its third goal statement which calls for the "recognition of the vocational preparation needs of all

students, including gifted students, as well as vocational requirements for middle-range skilled positions" (cited in Secondary Vocational Education's Math and Science Contribution, 1982, p. 2).

In keeping with a progressive education/open classroom tradition, vocational education provides a range of options for the systematic application of basic skills in real-life practical settings unparalleled in traditional classrooms. Small class size, extended class periods and the personal contact they afford provide the vocational educator with an opportunity for thoroughly understanding academic deficiency and offers an ideal opportunity for meeting these needs in a manner that is unmatched in other settings. With the development of strong systems approaches and needs assessment techniques in vocational education, the diagnosis of problems and prescriptive teaching to eliminate weakness becomes more practical than in traditional academic classrooms (Mrachek, 1984).

It is important to indicate that there are several important areas that will be affected by the products developed as a part of this project that will extend far beyond the limits of the current project. First of all, the developed materials will be useful tools in stimulating the development of instructional approaches and resources for including science in the vocational education curriculum. Secondly, personnel of science and vocational programs should profit from collaborative experiences which promote awareness of the levels of science required in vocational and occupational areas.

The dissemination of project results should do much to make the public aware of the role vocational education plays in helping students acquire fundamental, science skills. Thus, vocational education should be more readily seen as one of the viable options for delivering science instruction to learners. Some states' agencies have begun to respond to this role by allowing basic skills credits for work done in vocational education. The Virginia Board of Education has shown recognition of the complexity of vocational mathematics and science by approving a vocational alternative for one mathematics

or science course. A mathematics or science requirement may be met in the 20-credit diploma program by completing a sequence of courses for occupational preparation in agriculture, business, distribution, health occupations, occupational home economics and trade and industrial education. Persons representing other vocational programs are continuing to work closely with mathematics and science personnel to prepare their alternative programs (Brown, 1984).

Purpose

The objectives of the project were to:

1. Identify science competencies covered in three selected vocational programs: Consumer and Homemaking Education, Business and Office Education, and Marketing and Distributive Education.
2. Develop subcompetencies to reflect the science skills implied in identified vocational competency statements.
3. Validate the accuracy and effectiveness of developed subcompetencies for reflecting the science content and instruction in identified vocational courses.
4. Develop a training/dissemination paper which will include:
   a. Background and procedural information
   b. A list of vocational competencies that have been identified as having science skills associated with specific tasks/outcomes performed in each of the vocational courses
   c. Subcompetencies for each competency statement identified as having implied science content
   d. A matrix which illustrates the required science skills for each of the selected vocational courses
   e. An annotated bibliography of selected references and curriculum materials
5. Provide training for a selected group of vocational education personnel in instructional utilization of the developed material and approaches.

In addition to the objectives related to the development, training and dissemination purposes of the project, the researchers felt that it was important to collect data to verify the effectiveness of the developed material. Statistical analysis was used to test the hypothesis that there will be no significant differences between the perception of science content covered in vocational courses by subjects who review current vocational competency statements and the ratings by subjects who review revised science competency statements.

Procedure

The first step in the project was to select an advisory committee. The committee consisted of chief consultants of the vocational programs concerned, regional coordinators, local directors, high school teachers and teacher educators.

The committee served both an advisory and evaluative function. Joint meetings of the advisory committee and project directors were scheduled at the beginning and near the end of the project. Quarterly reports were sent to the committee members to keep them advised of progress and to offer opportunities for further input.

The chief consultants of the three vocational areas selected two courses to be analyzed for science content. They also supplied the competency lists for the identified courses. Teams of knowledgeable science and vocational teachers in eastern North Carolina were selected to work together to identify, analyze and develop subcompetencies which reflect the science content in each of the three vocational areas. The teachers were selected based on the recommendations of program consultants, teacher educators and other teachers. A science teacher educator served as the leader for this phase of the work. Workshop participants included twelve high school teachers -- six science teacher and two teachers each from Consumer and Homemaking Education, Business and Office Education, and Marketing and Distributive Education).

The teachers and leader met in two all-day sessions on the East Carolina University Campus. The sessions proceeded as follows:

a. Overview and orientation
b. Review of science goals and performance indicators
c. Review of vocational education goals and performance indicators
d. Identification of vocational competencies which require science skills
e. Development of necessary subcompetencies using science terminology to convey the content in the identified competencies
f. Development of a matrix of science competencies identified in the vocational competencies

The materials developed were reviewed by vocational and science teacher educators to validate the accuracy of the content covered.

The effectiveness of the developed subcompetencies for conveying the science content covered in the identified vocational program was assessed by administering an instrument to subjects representing business, parents, teachers and students. Each group of subjects completed the instrument before and after reviewing the two sets (current and revised) of vocational competency statements.

The RFP requested that a useable training/dissemination paper be developed which would be helpful to teachers and other vocational personnel. This material is included in this booklet. It was further required that at least 150 vocational education persons be trained in the use of the materials developed.

The standard State Department of Public Instruction training session evaluation device will be used to assess the effectiveness of training/dissemination workshops. Responses from these instruments will be submitted to frequency counts. Percentages will be used to evaluate the reaction of the participants to the developed materials and the training/dissemination workshops. A positive response of fifty-one percent and above will denote a favorable rating.

Findings

Since important purposes of the project were to make individuals aware of the activities of the study and to involve a number of persons in the validation and dissemination stages, a sample of 469 science and vocational education students, teachers, parents and business/industry persons was used to validate the materials. Table 1 describes the subjects involved in reviewing both the original and the revised competency material.

Table 1: Sample Size and Characteristics of Subjects

	Business and Office				Home Economics				Marketing and Distributive			
	Original		Revised		Original		Revised		Original		Revised	
	N	%	N	%	N	%	N	%	N	%	N	%
Sex												
Female	31	52.5	37	88.1	49	47.7	73	58.9	62	79.5	30	50.0
Male	28	47.5	5	11.9	56	53.3	51	41.1	16	20.5	30	50.0
Category												
Student	45	76.3	36	85.7	80	76.2	101	81.5	66	84.6	47	78.3
Business	10	16.9	5	11.9	15	14.3	5	4.0	3	3.8	9	15.0
Educators	4	6.8	1	2.4	10	9.5	18	14.5	9	11.5	4	6.7

The subjects' perception of the science content included in selected vocational courses was determined by their response to the questionnaire item: "I feel that (the name of each course was placed in blank) courses taught in high school include a great deal of science content." Before reviewing the business and office education materials, 37.6% of the combined pretest subjects responded positively to the item; whereas, 40.7% of those reviewing the original competency statements agreed and 59% of those reviewing the revised materials agreed. It appears that the gain in the posttest rating by the subjects does indicate that the revised materials were effective in influencing perception of the science included in the business and office education program.

Prior to review of the home economics education material, 61.6% (141) of the combined pretest sample disagreed that the courses included a great deal

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of science content. However after review of the original material, 70.5% gave a positive rating and 89.5% agreed after reviewing the revised material. These data seem to indicate that the material was effective in changing the perception of subjects in this area.

Of the subjects involved in review of the marketing and distributive education materials, 63% of the pretest subjects agreed that this program included a great deal of science content. After review of the original materials, 70.5% agreed and 86.7% agreed after review of the revised material. The data would tend to imply that the materials did make a significant difference in the perception of the subjects in this area. See Table 2 for a summary for all program areas.

Table 2: Perception of Science Taught in Selected Vocational Courses

Program Area	Combined Pretest Rating				Posttest Rating, Original Material				Posttest Rating, Revised Material			
	Disagree		Agree		Disagree		Agree		Disagree		Agree	
	N	%	N	%	N	%	N	%	N	%	N	%
Business & Office (N=101)	63	62.4	38	37.6	35	59.3	24	40.7	17	40.5	25	59.5
Home Economics (N=229)	141	61.6	88	38.4	31	29.5	74	70.5	13	10.5	111	89.5
Marketing & Distributive (N=138)	87	63.0	51	37.0	23	29.4	55	70.5	8	13.3	52	86.7

Table 3 presents data relative to the subjects' perception of the kinds of science included in each of the courses before and after review of the materials.

Table 3: Perception of Specific Kinds of Science Taught in Selected Vocational Courses

Course	Business and Office								Home Economics								Marketing and Distributive							
	Original (N=59)				Revised (N=42)				Original (N=105)				Revised (N=124)				Original (N=78)				Revised (N=60)			
	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Life Science	22	37	57	97	10	24	39	93	41	39	105	100	68	55	122	98	45	58	78	100	39	65	60	100
Physical Science	14	24	19	32	12	29	18	43	47	45	64	61	34	27	93	75	34	44	39	50	24	40	44	73
Biology	5	8	18	31	6	14	21	50	64	61	51	49	41	33	69	56	27	35	38	49	6	1	40	67
Chemistry	9	15	4	7	5	12	21	50	35	33	76	72	23	19	92	74	9	12	14	18	17	28	29	48
Physics	10	17	8	14	1	2	17	40	14	13	53	50	11	9	72	58	20	26	21	27	20	38	28	47

Posttest gains were made for all programs on the perception of kinds of science included in selected vocational courses except in ~~the area of~~ life science. When the data were combined for all program areas, 48% of the pretest

subjects disagreed with the questionnaire item concerning the courses' ability to give students an opportunity to study, practice and apply life science. The combined posttest ratings for the original and revised materials were similar, 99% and 97% respectively, thus indicating that the original competency statements were just as effective as the revised material for conveying life science content.

A significant difference was not found between the rating of the original and revised home economics materials for chemistry. The pretest and posttest difference was apparent; however, the ratings given the original competency statements and the revised material were very similar with 72% for the originals and 74% for the revised material.

It was determined that, overall, the revised competency materials were effective in improving the perception of the science included in selected vocational courses. It also appears that these materials can be used successfully as a tool to increase the visibility of the science content that is included in these programs.

Participants were asked to include comments on the questionnaires. Based on these comments and careful analysis of the data, materials were revised as indicated.

USE OF MANUAL AND TRAINING MATERIALS

Rationale of Training Design

The purpose of this section of the manual is to aid in using the developed materials. Recognizing that curriculum materials tend to be more effective when users have an integral part in the development and adaption of the materials for specific groups, no attempt has been made to recommend specific instructional strategies. Rather, to provide the vocational educator with a "starting place" in planning, a comprehensive list of science skills and subcompetencies has been developed for each of the selected courses. Thus, the materials and the training have been designed as a model for curriculum development rather than a prescription. Ideally, this method will help vocational educators learn a process that can be used regardless of changing curricula.

Use of Training Materials by State Staff, Local Administrators and Workshop Leaders

The manual provides a step-by-step guide for the implementation of a workshop or it may be used in one-to-one training sessions with individuals. It is planned to provide assistance to vocational and science educators--administrators, teachers and counselors--in two ways: first, in identifying their responsibilities in promoting the instruction of science in vocational education and second, in conveying information regarding science in vocational education to the general public.

The training and materials may be used in several ways:

1. As a means for designing and supporting materials for workshops for educational personnel.
2. As a basis for development and coordination of classroom activities by vocational and science teachers.
3. As stimulus materials for adapting and designing other activities or materials which can assist vocational educators (curriculum

materials, recruitment information, public relation packets).

4. As resources for the preservice education of science and vocational educators (Kaser, 1978).

Use by Vocational and Science Teachers

The ultimate goal of the project is to improve teacher instruction and thus the education of vocational educational students. The involvement and implementation by teachers is therefore vital to the success of the training and the materials. The project staff hopes that training leaders will assist teachers with implementing the process of using these materials.

Most curriculum developers agree that there are at least three basic steps in curriculum development which must be considered in planning instruction. The first task is the statement of objectives. Using the competency statements and subcompetencies, the teacher can develop specific performance objectives based on student needs.

The next task is the development of activities and experiences in which students will be involved. The key to success in this second task is to select situations to facilitate this process. A passive, lecture-response situation is not likely to contribute to a successful experience for vocational students who often perceive science to be a difficult subject. Kenneke, (1980), states that the semiconcrete and abstract modes are over emphasized in teaching. Teachers must select activities that provide concrete experiences to help vocational students grasp the meaning of science. Vocational courses offer unlimited possibilities for alternative strategies to those found in the science classroom.

The third task is for teachers to devise techniques for evaluating the development of students and the program. Hopefully, teachers will also be able to clearly illustrate the value of including science in vocational courses.

Because vocational educators will seldom be experts in science,

utilizing the talents of science teachers is of utmost importance to the success of these curriculum materials and the training process. Ideally, personnel from both areas will work together for coordination of resources, content and coverage.

Development of Competency Materials

An extensive listing of skills and subcompetencies has been included to illustrate not only what is currently being taught in the selected courses, but to show the breadth and diversity of science content which can be taught or reinforced in vocational programs. Of course, all such content cannot be covered, so these competencies can be realized only in degrees and levels relative to the teacher, student, and the instructional competency. But perhaps the listing may spur vocational educators to define the scope of science found in their selected courses and set reasonable parameters.

Format of Competency Statements

The format used was selected to facilitate the use of the competency statements by teachers and includes the following components:

1. Competency Statements

   Competency statements are taken from those distributed by the Division of Vocational Education, State Department of Public Instruction (1980) and can be found in Competency Goals and Performance Indicators K-12, Vocational Education Supplement VEC-1980. Competency statements appear exactly as printed except for editorial changes necessary for format consistency.

   During the research activities for the project, competency statements for Distributive Education courses were also taken from the above source. Since the field test stage, however, a new list of competency statements has been identified for the Marketing course. The project staff and a workshop Distributive Education teacher

acting as consultant used the workshop materials to match science skills and subcompetencies from the "old list" to the competencies specified in the new list for the Marketing course. This revised list was not field tested.

2. Science Skills

The science skill statements indicate the science skill needed to accomplish the identified vocational learning task. These have been extrapolated from the science competencies listed in Competency Goals and Performance Indicators (North Carolina Department of Public Instruction, 1980).

3. Subcompetencies

These are the task statements generated from the merger and refinement of the original vocational education competency statements and the science competencies and/or skills implied. In developing these materials, the project staff had to establish certain procedures to delimit the scope of the materials. In making procedural decisions, careful deliberation was given to suggestions from workshop and advisory committee members. Selected examples of procedures followed are given below:

-Subcompetencies identified for the "old list" of Distributive Education competency statements were grouped as seemed appropriate under the new, more general competency statements developed for the Marketing course. Some subcompetencies that could not be readily recategorized were left off the new list.

-Where the original competency statements for a course included specific science competencies which seemed to have been designed to reflect the science content covered, no additional attempt was made to restate that content in the form of subcompetencies.

4. Revised Competencies

The term "revised competencies" is used when the original competency statement has been only slightly reworded to more clearly reflect the science content indicated.

Use of the Matrix

The matrix has been developed as a visual tool to be used by vocational educators in discussing the science skills included in each of the selected programs. It should be most helpful in illustrating to the general public and educational policy makers the amount of science content that is possible in vocational education instruction.

Bibliography of Curriculum Materials

A major task of the project staff was to review existing curriculum materials. It was hoped that an abundance of materials could be found which would be useful in teaching science in the specified vocational courses. After an extensive search, no science curriculum material for the selected areas was found. However, excellent instructional materials for teaching science are readily available. These should be helpful to the teacher in reviewing basic science skills and as resources in planning instructional strategies.

FORMAT AND TRAINING SESSION

Overview

The materials developed for the project are aimed at assisting vocational personnel who are interested in improving the science instruction currently offered in vocational education. In addition, these materials can improve the visibility of science that is inherent, needed and/or reinforced in selected vocational courses. Competencies for three vocational program areas were analyzed by science and vocational teachers for science content (see appendix). The analyzed courses are:

Business and Office Education

- Accounting
- Office Occupations

Home Economics Education

- Foods/Nutrition
- Personal/Family Living Skills

Marketing and Distributive Education

- Marketing

The training is designed for the workshop format, but because of its flexible nature, may be used in a variety of situations to assist the educator--administrator, teacher or counselor--in identifying particular responsibilities and needs when providing science instruction for the vocational program. This step-by-step process is provided as a guide in implementation.

Objectives

The objectives of the workshop are to assist vocational and science educators to:

1. Recognize the science content included in the identified vocational courses.
2. Conduct a similar training session.
3. Adapt materials for program use.

OUTLINE OF WORKSHOP PROCEDURE

I. Introduction

A. Significance of the Study

B. Purpose of the Study

C. Procedures of the Study

D. Results of the Study

Analyzed Competencies and Findings
Matrix
Bibliography of Curriculum Materials

II. Group Work with the Products

Have participants:

A. Select one of the program areas

B. Select one course and complete Form I

C. Report findings back to entire group

III. Development of a Plan of Action

Have participants:

A. Form appropriate working groups (science and vocational teachers or local director and teachers)

B. Develop a plan of action to be implemented

C. Report back to entire group

D. Listen to other groups and record applicable ideas

IV. Summary

FORM I

PLANNING SESSION (Duplicate as necessary)

Course_____ Competency No._____

Science Skill:

Subcompetency(ies):

Suggested Learning Experiences: (It may be helpful to consider the following questions.)

1. What are specific learning experiences which can be used to help students accomplish the competency you selected?
2. What are specific science activities that could be incorporated in the learning experience which will teach or reinforce the science concepts indicated in the subcompetency(ies)?

FORM II

PLAN OF ACTION (Duplicate as necessary)

Program(s) Areas_____ Course_____

Action Planned	Improvement Anticipated (who, what, when, where, how)

Discussion Point

In what way, if any, would this change teaching in the course/program?

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APPENDIX

Vocational Education Program: Business and Office Education
Course: Office Occupations I, II

COMPETENCY STATEMENTS ANALYZED FOR SCIENCE CONTENT
(Competency Goals and Performance Indicators K-12, Vocational Educational Supplement VEC - 1980. NC Department of Public Instruction, Raleigh, NC, 1980.)

Office Orientation

001. Analyze the duties, knowledges, skills, and personal traits needed to perform within an office setting of a business.
- 01. Identify the types and functions of offices as they relate to the total operation of businesses.
  Science Skill: Observe and identify.
- 02. Describe how the type and size of a business determine office organization.
- 03. Identify at least five classifications of office workers and list the duties, knowledges, skills, and personal traits needed for each.
  Science Skill: Classify data.
- 04. Explain the interrelationships of office jobs.
  Science Skill:
  1. Understand the implications of humans in their environment.
  2. Understand that a community is made up of interacting populations.
  Subcompetency:
  1. Describe effects people have had and are having on the environment and relate this to the different office jobs.
  2. Classify office jobs as to the role they play in an office community.

Oral Communications

002. Demonstrate basic language skills through oral communications.
- 01. Receive callers in a pleasant, courteous manner and direct them to the appropriate person, if necessary.
- 02. Select appropriate telephone/telegraphic/mailgram services when given specific examples.
- 03. Use correct telephone techniques for greetings, referrals, screening, making appointments, routing, and terminating calls.
- 04. Place and answer telephone calls that give and receive accurate business information.
  Science Skill:
  1. Understand how time zones are determined using the earth's rotation.
  2. Use instruments.
  Subcompetency:
  1. Identify the time differences involved in placing and receiving calls within/between different time zones.
  2. Demonstrate the use of communication equipment for business purposes.
- 05. Use telephone directories correctly.
- 06. Maintain a record of appointments made through telephone calls, letters, and person-to-person.
- 07. Recognize characteristics of effective oral communication.
  Science Skill: Communicate effectively.

Information Processing

003. Process information in a business using identified procedures.
- 01. Identify the steps in the data processing cycle.
  Science Skill: Classify according to similarities.
- 02. Explain the importance of electronic data processing equipment to business operations.
  Science Skill:
  1. Understand basic electronic circuitry.
  2. Understand the importance of electronics to our society.
  Subcompetency:
  1. Explain basic computer circuitry used in electronic data equipment.
  2. Relate importance of computer technology in our society.
- 03. Define the following basic terms in data processing: electronic data processing, data, input, output, memory, source document, and central processing unit.
- 04. Explain the following methods of processing data: manually, mechanically, and electronically.

Note: The listing of science subcompetencies is comprehensive. Appropriate learning experiences should be selected based on student need.

05. Calculate manually the following mathematical computations: converting fractions to decimals, converting percents to decimals, figuring percentage of increase and decrease, discounts, markup and markdown, and interest.
06. Operate ten-key adding machines and electronic calculators to do basic mathematical computations.
Science Skill: Understand that machines are devices that assist with work.
07. Use a transcriber and electric typewriter to prepare mailable letters, reports, and other correspondence according to office production standards.
Science Skills: Understand that machines are devices that assist in doing work.
08. Compose and dictate mailable business letters using a transcriber.
Science Skill: Understand that machines are devices that assist in doing work.
09. Type tables and reports in mailable form using an electric typewriter.
Science Skill:
1. Transmit observable data.
2. Understand that machines are devices that assist in doing work.
Subcompetency: Record observed information from records in simple, clear tabular form.
10. Type mailable printed business forms using an electric typewriter.
Science Skill: Understand that machines are devices that assist in doing work.
11. Compare the organization of a traditional office setting to that of a company using word processing centers.
Science Skill: Observe and classify.
Subcompetency: Identify the similarities and/or differences between traditional office settings and those using word processing centers.
12. Compare the cost of the three methods of originating a business letter: shorthand, longhand, or transcribing machine.
Science Skill: Observe and interpret data.
13. Identify the types of word processing equipment currently being used by businesses.
14. Locate business information using reference and other sources.
15. Demonstrate legible handwriting in preparing handwritten documents.

Interpersonal Skills

004. Exhibit interpersonal skills, work habits, and attitudes that are acceptable in business.
01. Solve human relations problems that might occur in the office during a business day.
Science Skill: Understand the implications of social/ethical biology.
Subcompetency: List the consequences of the use of alcohol, narcotics, and tobacco as it relates to the general health of office workers.
02. Work cooperatively with co-workers and supervisors.
Science Skill: Understand that all organisms exhibit behavior (response to stimuli).
Subcompetency: Describe basic human behavior such as aggression, cooperation, assertiveness, body language, etc.
03. Demonstrate ability to work independently.
04. Communicate ideas effectively to individuals and/or groups.
05. Listen attentively.
06. Display tact and courtesy in an office setting.
07. Maintain appropriate personal hygiene and appearance.
Science Skill: Understand viruses and bacteria.
Subcompetency: Explain how communicable diseases may be transmitted through inappropriate personal hygiene practices.
08. Use materials and equipment and maintain work area in a responsible manner.
Science Skill: Understand that machines are devices that assist in doing work.
Subcompetency: Demonstrate the proper use of and care for materials and equipment appropriate for the student's grade level or course.
09. Follow oral and written instructions correctly when performing job tasks.
10. Describe basic office customs and acceptable social behavior in an office setting.
11. Plan and organize work by setting priorities for performing job tasks.
12. Demonstrate the ability to complete job tasks while working under pressure of time, interruptions, noise, and changing priorities.

Records Management

005. Development concepts about file organization and management.
  01. Compare the advantages and disadvantages of each of the four filing systems.
    Science Skill: Observe and interpret data.
  02. Inspect, index, code, cross-reference, and arrange in alphabetical order materials to be filed.
    Science Skill: Classify data.
  03. Sort, file, and retrieve information correctly using alphabetic and subject file systems.
    Science Skill: Classify data.
  04. Retrieve information when geographic and numeric files are used.
  05. Identify types of filing equipment and supplies used in businesses.
  06. Explain acceptable office practices for removing records from the files, transferring files, and retaining files.
  07. Explain the advantages of using the following types of micrographics to retain records for a business: microfilm, microfiche, aperture card, and computer output microfilm, (COM).
  08. Explain how electronic data processing equipment increases the efficiency of storing and retrieving records.
    Science Skill: Demonstrate basic knowledge of solid-state physics (computer circuitry).
    Subcompetency: Relate several applications of solid-state physics in industry and in the production of items commonly used by offices such as electronic data processing equipment.

006. Prepare copies of materials after deciding upon the appropriate process of reproduction in terms of product, cost, and use of copies.
  01. Prepare, correctly proofread, and duplicate a specified number of copies, showing efficient operation of a copying machine or duplicating machine.
    Science Skill: Understand that machines are devices that assist in doing work.
  02. Select the appropriate process of reproduction in terms of product, cost, and use of copies for a particular job.
    Science Skill: Develop a positive attitude toward the need for conservation, preservation and wise use of natural resources.
    Subcompetency: Demonstrate the need for people to conserve, preserve and make wise use of natural resources.
  03. Compare the advantages and disadvantages of the photocopying process.
    Science Skill: Interpret data.

Mail and Shipping Services

007. Process interoffice, incoming, and outgoing mail proficiently.
  01. Select appropriate mail services so that communication can be sent by the appropriate method in terms of importance, time factor, and cost.
    Science Skill: Classify and interpret data.
    Subcompetency: Classify a group of objects according to their various properties.
  02. Describe the classes of USA mail and special mailing services.
  03. Sort incoming mail and arrange in priority order for employees to handle.
    Science Skill: Classify data.
  04. Identify duties of an office worker in handling incoming and outgoing mail.
    Science Skill: Observe, interpret data, draw conclusions and define operationally.
  05. Use suggested format of the United States Postal Service for addressing envelopes.
  06. Prepare and update mailing lists.
  07. Chain feed envelopes with proficiency.

Written Communications

008. Compose and type in mailable form business correspondence in a clear, concise, and courteous manner.
  01. Spell and define selected business terms from a variety of sources.
  02. Use correct spelling, grammar, and punctuation in typing business correspondence, reports, business forms.
  03. Proofread, edit, and type in mailable form from roughdraft letters, reports and memorandums, carbon copies, envelopes, and enclosures.

04. Choose from selected sentences or paragraphs the one in each case which best exhibits effective business communications for answers to specific correspondence.
Science Skill: Analyze, evaluate, interpret data and draw appropriate conclusions.
Subcompetency: State logical conclusion (make proper choice) when given data concerning examples of effective and ineffective business correspondence.
05. Use correct spelling, grammar, and punctuation in composing and typing business correspondence, reports, legal papers, and minutes.
06. Explain how appearance, accuracy, relevance, timeliness, and readability of letters and reports convey an impression of the writer to the reader.

Skills for Office Employment

009. Develop interviewing skills that will enable the applicant to be considered for a job of his or her choice.
01. Describe how sources of job information may be used in securing a job in business.
02. Compose and type in mailable form a letter of application and personal data sheet according to given format in response to position available in the area of business.
03. Complete a job application form correctly and legibly.
04. Demonstrate the ability to apply for a job and to conduct oneself according to acceptable procedures during an interview situation.

Cash Control Systems

010. Process data used in a cash control system correctly.
01. Define selected terms relating to cash control.
02. Endorse checks and prepare deposit slips for a business account.
03. Prepare checks and check stubs in correct form when given a selected number of invoices to be paid.
04. Reconcile a bank statement of a business correctly.
Science Skill:
1. Classify data.
2. Interpret data.
3. Use numbers.
Subcompetency:
1. Classify similar expenditures on a bank statement.
2. Interpret data from cancelled checks, stubs, and other records to reconcile business bank statements.
05. Identify situations where a voucher check, certified check, bank draft, cashier's check, and money order may be used in making payments for a business.
Science Skill: Observe and infer.
06. Establish, record payments, and replenish petty cash funds using acceptable office procedures and a calculator.
Science Skill: Use equipment.
Subcompetency: Demonstrate the proper use of a calculator.
07. Compose and type in mailable form routine correspondence relating to cash control.
08. Explain the legal ramifications a business must consider when an individual handles significant amounts of money.
Science Skill: Interpret data and predict and/or infer.

Inventory Systems

011. Process data used in an inventory system correctly.
01. Define selected terms relating to inventory control.
02. Compare a computerized inventory system to a manual inventory system.
Science Skill: Observe and classify.
03. Explain the importance of accurate inventory control to the successful operation of a business.
04. Explain the interdependence of the inventory function and the purchasing function of a business.
05. Compare the two basic methods of keeping inventory - perpetual and periodic.
Science Skill: Observe and classify.
06. Explain why an increasing number of businesses are relying upon automated data processing equipment to maintain inventory control.
Science Skill Required: Infer from data.
07. Prepare inventory control cards after making comparisons of purchase orders, invoices, and/or receiving reports using a calculator.

Science Skill:
1. Understand that machines are devices that assist in doing work.
2. Observe and interpret data.

08. Make decisions to record stock when given specific information about company policies.
Science Skill: Interpret data.

09. Set priorities for completing the following functions: recording goods received, comparing invoices with purchase orders, and filling requisition requests.
Science Skill: Observe and interpret data.
Subcompetency: Identify the similarities and/or differences, when recording goods received, comparing invoices with purchase orders, and filling requisition requests.

10. Compose and type in mailable form routine correspondence relating to inventory control.
Science Skill: Interpret data.
Subcompetency: Analyze inventory control records to determine information needed in composing related correspondence.

11. File inventory control cards using an acceptable filing system.
Science Skill: Classify data.
Subcompetency: Classify inventory control cards to be filed.

Payroll Systems

012. Process data used in a payroll system correctly.

01. Define selected terms relating to payroll.
Science Skill: Define operationally.
Subcompetency: State working definitions of payroll terms based upon past learning experiences.

02. Compute wages when given hourly rates, piece rates, and commission percentages using a calculator.

03. Prepare a payroll register for employees based on given information.
Science Skill: Interpret data.

04. Transfer information accurately from a payroll register to employees' earning records.
Science Skill: Understand the importance of accuracy and precision in scientific work.

05. Compare the speed and accuracy of a computer system used for the same process.
Science Skill:
1. Understand basic circuitry and the importance of electronics to our society.
2. Observe and interpret.
Subcompetency: Identify the similarities and/or differences between computer and manual systems used for the payroll process.

Purchasing Systems

013. Process data used in a purchasing system correctly.

01. Define selected terms relating to the purchasing function of a business.
Science Skill: Define operationally.

02. Compare the procedures of a business using centralized purchasing versus decentralized purchasing.
Science Skill:
1. Observe data.
2. Understand the importance of using a scientific method to solve many everyday problems.
Subcompetency: Identify the similarities and/or differences between centralized purchasing and decentralized purchasing .

03. Use recognized sources of information about suppliers of materials in catalogs, trade directories, and the Yellow Pages when preparing purchase orders and letters of inquiry.
Science Skill: Classify data.

04. Compute trade, cash, and quantity discounts using a calculator.
Science Skill: Understand that machines are devices that assist in doing work.

05. Identify at least three ways an order may be placed with a vendor.

06. Explain how computer systems speed the ordering of materials and supplies needed frequently by a business.

07. Prepare reports in typewritten form that would assist purchasing agents in comparing costs of materials that would be considered for purchase.

08. Compile and type requests for quotations in acceptable form when given copies of purchase requisitions.
09. Prepare purchase orders in typewritten form after using a calculator to compute extensions.
Science Skill: Understand that machines are devices that assist in doing work
10. Compare purchase orders to corresponding invoices, and receiving reports to determine errors in computations, terms, packing, and accuracy of shipment.
Science Skill: Observe and classify.
Subcompetency: Identify the similarities and/or differences, in purchase orders, corresponding invoices and receiving reports.
11. Compose and type in mailable form letters of inquiry about vendor materials and letters requesting credit for returned or damaged materials.

Sales Systems

014. Process data used in a sales system.
01. Define selected terms relating to sales.
02. Explain the dependence of the total operation of a business on sales.
03. Identify various methods or sales used by businesses.
04. Explain a statement of account prepared by electronic data processing equipment to a customer.
Science Skill: Interpret data.
Subcompetency: State a logical conclusion based on a statement of account prepared by electronic data processing equipment.
05. Select the appropriate method of shipping goods when given specific examples.
Science Skill:
1. Classify data.
2. Interpret data.
Subcompetency: Identify similarities and differences between different shipping methods.
06. Compose and type in mailable form sales letters, inquiry letters, and adjustment letters.
07. Use acceptable procedures in processing a telephone request for products or services.
Science Skill: Understand the importance of using a scientific method to solve many everyday problems.
Subcompetency: Determine an acceptable procedure in processing a telephone request for product service.
08. Handle mail order requests properly by checking for completeness, accuracy, and credit references.
Science Skill: Understand the importance of accuracy and precision in scientific work.
Subcompetency: Demonstrate accuracy and precision in computing data.
09. Prepare in typewritten form sales invoices by computing extensions and including all pertinent information.
10. Prepare in typewritten form credit memorandums.
11. Prepare expense reports of a sales representative using a calculator.
Science Skill: Understand that machines are devices that assist in doing work.
Subcompetency: Demonstrate the proper use of a calculator.

Planning Business Travel

015. Use travel and accommodation services in planning and expediting business trips.
01. Prepare and type an itinerary in acceptable form.
Science Skill: Understand the importance of using a scientific method to solve many everyday problems.
Subcompetency: Utilize the scientific method in preparing an acceptable itinerary.
02. Compose and type a mailable letter of reservation for a hotel/motel room.
Science Skill: Understand that machines are devices that assist in doing work.
Subcompetency: Demonstrate the proper use of equipment when making reservations on a typewriter or a computer.
03. Use a telephone to make airline and hotel reservations by giving clear, concise, and accurate information.
04. Identify situations when the following types of funds are used to pay travel expenses: traveler's checks, credit cards, personal checks, certified checks, cashier's checks, and cash.

Science Skill:
1. Observe and classify.
2. Interpret data.

Subcompetency: Identify similarities and differences between the different methods of paying travel expenses.

05. Prepare a business expense report accurately.
Science Skill: Understand the importance of accuracy and precision in scientific work.

06. Read airline timetables or a guide to make airline reservations.
Science Skill: Interpret data.
Subcompetency: Make logical conclusions concerning preferred airline schedules after analyzing airline time tables.

Personal Taxes

016. Complete income tax returns correctly.
01. Identify sources of tax revenue (state, local, county, federal).
02. Describe the major areas in which tax revenues are expended.
03. Determine deductible and non-deductible expenses for tax purposes.
Science Skill: Classify and interpret data.
Subcompetency: Classify expenses into deductible and non-deductible expenses.

Meetings and Conferences

017. Plan a conference making all necessary arrangements.
01. Edit and type minutes of meetings in acceptable form.
02. Compose and type accommodation arrangements and followup letters.
03. Plan an agenda for a meeting according to acceptable procedures.
Science Skill: Understand the importance of using a scientific method to solve many everyday problems.
Subcompetency: Use the scientific method in planning an agenda for a meeting.
04. Organize appropriate materials to be used in a meeting.
Science Skill: Classify data.

Vocational Education Program: Business and Office Education
Course: Accounting I, II

COMPETENCY STATEMENT ANALYZED FOR SCIENCE CONTENT
(Competency Goals and Performance Indicators K-12, Vocational Educational Supplement VEEC - 1980. NC Department of Public Instruction, Raleigh, NC, 1980.

Careers in Accounting

001. Explain the type of careers available in accounting and related occupations.
   01. Identify basic reasons for studying accounting.
   02. Identify entry-level accounting positions open to the high school graduate.

The Accounting Cycle

002. Analyze transactions relating to completing a simple accounting cycle.
   01. Prepare a balance sheet when assets and liabilities are given.
   Science Skill: Classify data.
   Subcompetency: Classify and label items using a balance sheet.
   02. Use the accounting equation to determine the accuracy of a balance sheet.
   03. Record opening entries in a general journal.
   04. Analyze the effects of assets, liability, owner's equity, revenue, and expense transactions.
   Science Skill: Interpret data.
   Subcompetency: Use the data collected to make logical conclusions regarding the effects of assets, liability, owner's equity, revenue, and expense transactions.
   05. Prepare an income statement when revenue and expenses are given.
   Science Skill: Classify data.
   Subcompetency: Classify revenue and expense figures when preparing an income statement.
   06. Describe the basic accounting principles of debit and credit for balance sheet accounts.

Maintaining Simple Accounting Records

003. Journalize and post business transactions in appropriate general and special journals and ledgers.
   01. Identify selected accounting terms related to the accounting cycle.
   02. Identify source documents used in recording transactions in a general and cash journal.
   Science Skill:
   1. Observe.
   2. Classify data.
   Subcompetency:
   1. Compare similarities and/or differences when identifying terms related to the accounting cycle.
   2. Classify source documents used in recording transactions in a general and cash journal.
   03. Post general and cash entries into appropriate ledger.
   04. Prove the accuracy of a cash journal.
   05. Prepare a trial balance after proving ledger account balances.
   06. Prepare a balance sheet and income statement from work sheet.
   Science Skill: Classify data.
   Subcompetency: Classify a group of objects or concepts according to their various properties.
   07. Compare manual and computer systems in journalizing and posting source document information to appropriate journals and ledgers.
   Science Skill: Observe.
   Subcompetency: Identify the similarities and/or differences between manual and computer systems.
   08. Analyze the accounts in a trial balance by preparing a work sheet.
   Science Skill: Interpret data.
   Subcompetency: Using data, analyze the accounts in a trial balance sheet.

NOTE: 1. The listing of science subcompetencies is comprehensive. Appropriate learning experiences should be selected based on student need.
*2. Original competency statement has been reworded to indicate science content.

09. Close revenue and expense accounts correctly.
10. Explain why some ledger accounts are closed while others remain open.
    Science Skill: Interpret data.
    Subcompetency: State logical conclusions which are based on a collection of data to determine the opening and closing of ledger accounts.
11. Describe the steps of the accounting cycle by using a systems flowchart.

Banking Activities

004. Analyze the transactions and procedures relating to basic banking activities.
    01. Prepare checks and check stubs using acceptable accounting practices.
    02. Endorse checks and prepare deposit slips for a business correctly.
    03. Record journal entries needed as a result of reconciling a bank statement.
    04. Analyze the establishing, recording, and journalizing of petty cash entries.
        Science Skill:
        1. Observe.
        2. Classify data.
        Subcompetency:
        1. Identify the similarities and/or differences in petty cash entries.
        2. Classify data when establishing, recording, and journalizing petty cash entries.

Payroll Systems

005. Process data used in a payroll system correctly.
    01. Define selected terms relating to payroll.
    02. Compute wages when given hourly rates, piece rate, and commission percentages using a calculator.
    03. Prepare a payroll register for employees based on given information.
    04. Transfer information accurately from a payroll register to employees' earning records.
    05. Compare the speed and accuracy of a computer system used for the payroll process to a manual system used for the same process.
        Science Skill: Observe data.
        Subcompetency: Identify the similarities and/or differences in speed and accuracy between the computer system and the manual system when doing payrolls.
    06. Record and post transactions relating to the processing of payroll records.

Accounting Subsystems

006. Identify four accounting subsystems used in many businesses.

007. Compare the difference between the accounting cycle of a merchandising business and one for a service business.
    Revised Competency: Identify the similarities and/or differences between the accounting cycle of a merchandising business and a service business.
    Science Skill: Observe.

Cash Receipts

008. Analyze transactions relating to cash receipts.
    01. Check the accuracy of source documents that are used in recording cash receipts.
        Science Skill: Recognize the importance of accuracy and precision in scientific work.
        Subcompetency: Demonstrate accuracy and precision when recording cash receipts.
    02. Define selected terms relating to cash receipts transactions.
    03. Record cash receipt transactions correctly in a two column general journal as well as a multi column cash receipts journal.
    04. Post journal entries correctly from a cash journal to two column accounts in the ledger.
    05. Explain the procedure followed for proving cash when a cash register is used.

Accounting for a Purchases and Accounts Payable System

009. Analyze the transactions relating to purchases and accounts payable.
    01. Define selected accounting terms related to a purchases and cash payments system.

02. Name and describe the source document for journalizing each of the following: purchases for cash, purchase on credit, purchase returns and allowances, transportation charges, purchase discounts, and payments to creditors.
03. Record purchases on account transactions in a purchases journal.
04. Record cash payments transactions in a cash payments journal.
05. Describe handling of transportation charges on purchases.
06. Identify and describe the procedures for handling and recording cash payments using a systems flowchart.
07. Identify the control procedures used to account for and store merchandise.
Science Skill: Classify data.
Subcompetency: Classify purchases, returns and allowances when accounting for merchandise.
08. Explain how the purchases of merchandise affect net income or net loss.
Science Skill: Interpret data.
Subcompetency: State logical conclusions which are based on a collection of data showing the effect of merchandise purchases on net income and net loss.
09. List and explain the principles for the control of purchases of merchandise.
10. Describe the relationship between an accounts payable subsidiary ledger and an accounts payable controlling account.
Science Skill:
1. Observe.
2. Classify data.
Subcompetency:
1. Identify the similarities/differences between an accounts payable subsidiary ledger and an accounts payable controlling account.
2. Classify accounts according to their various properties.

Sales on Credit and Accounts Receivable

010. Analyze transactions relating to sales on credit.
01. Define selected terms relating to sales on credit transactions.
02. Compare the processing of credit sales to processing cash sales.
Science Skill: Observe.
Subcompetency: Identify the similarities and/or differences in processing credit sales to processing cash sales.
03. Record correctly sales of merchandise on credit in a sales journal.
Science Skill: Understand the importance of accuracy and precision in scientific work.
Subcompetency: Demonstrate accuracy and precision in computing and recording sales of merchandise on credit in sales journal.
04. Identify source documents used in making entries in a sales journal.
Science Skill: Classify data.
Subcompetency: Classify source documents used in making entries in a sales journal.
05. Post entries from a sales journal to the appropriate ledgers correctly.
06. Prepare a schedule of accounts receivable correctly.
Science Skill: Understand the importance of accuracy and precision in scientific work.
Subcompetency: Demonstrate accuracy and precision in recording data.
07. Compute and record sales discounts at appropriate times and in appropriate journals.
Science Skill: Classify data.
Subcompetency: Classify sales discounts and record in appropriate journals.
08. Post from the cash receipts journal to the appropriate ledgers correctly.
Science Skill: Understand the importance of accuracy and precision in scientific work.
Subcompetency: Demonstrate accuracy and precision when recording data in ledgers.
09. Compare a manual system and an automated system for processing records for sales and accounts receivable.
Science Skill: Observe.

Subcompetency: Identify similarities and/or differences in a manual system and an automated system for processing records for sales and accounts receivable.

Preparation of End-of-Period Adjustments and Statements

011. Analyze the transactions and procedures relating to updating accounts by adjustments and preparing balance sheets and income statements.
  01. Define selected terms relating to end-of-period adjustments.
  02. Describe the procedure that is followed in order to determine the cost of goods sold.
  03. Compute cost of goods.
  04. Record adjusting entries.
  05. Prepare a worksheet having the following sections: trial balance, adjustments, income statement, and balance sheet.

Bad Debts and Depreciation

012. Analyze transactions relating to bad debts and depreciation.
  01. Define selected terms relating to bad debts and depreciation.
  02. Record and post bad debts expense when the direct write-off method is used.
  03. Record and post allowances for bad debts when the allowance method is used.
  04. Identify three ways of estimating bad debts.
    Science Skill: Observe.
    Subcompetency: Through observation, identify ways of estimating bad debts.
  05. Age accounts receivable correctly.
    Science Skill: Understand the importance of accuracy and precision in scientific work.
    Subcompetency: Demonstrate accuracy and precision when aging accounts receivable.
  06. Record and post depreciation in the appropriate ledger account.
    Science Skill: Classify data.
    Subcompetency: Classify, record and post depreciation in ledger accounts.
  07. Record appropriate information about depreciation on subsidiary ledgers.
  08. Analyze a trial balance "Adjustment Columns" of a worksheet in which accumulated depreciation is included.
    Science Skill: Interpret data.
    Subcompetency: Using collected data, analyze a trial balance "Adjustment Columns"of a worksheet in which accumulated depreciation is included.

Accruals and Deferrals

013. Analyze transactions relating to accruals and deferrals.
  01. Define selectd terms relating to accruals and deferrals.
  02. Explain how adjusting entries for accrued revenues and expenses differ from other revenues and expenses.
    Science Skill: Observe.
    Subcompetency: Identify similarities and/or differences between entries for accrued revenues and expenses and other revenues and expenses.
  03. Record and post adjusting, closing, and reversing entries for accrued expenses and accrued revenues.

Combination Journals

014. Record the following transactions in a 10-column combination journal:
  a. Purchase of merchandise for cash.
  b. Purchase of merchandise on account.
  c. Sale of merchandise for cash.
  d. Sale of merchandise on account.
  e. Cash received on account.
  f. Cash withdrawal by owner using a drawing account.
  g. Correcting entries.

Data Processing

015. Identify business decisions that are made when converting from a manual accounting system to an automated accounting system.
  01. Define terms related to manual, mechanical, and electronic data processing systems for accounting.

02. Prepare selected accounting forms for use in an automated accounting system.
Science Skill: Interpret data.
Subcompetency: Interpret information found on manual accounting forms to determine those applicable to forms used in automated accounting systems.
03. Explain how data are prepared for computer systems.
04. Explain the flow of work between a computer center and an accounting department.
05. Prepare a chart of accounts by assigning numbers to accounts in the general ledger and subsidiary ledger when preparing for conversion from a manual to an automated accounting system.
06. Identify common language media for a computer system.
07. Identify typical ways electronic data processing equipment is used to process data for accounting and management use.
Science Skill:
1. Observe.
2. Understand machines.
Subcompetency:
1. Observe ways in which data processing equipment is used to process data for accounting and management use.
2. Explain how electronic data processing equipment operates.
08. Explain how a computer follows instructions in processing data for accounting applications.
Science Skill:
1. Observe.
2. Understand machines.
Subcompetency:
1. Observe and interpret how the computer processes data for accounting applications.
2. Explain how a computer operates.

Accounting for a Partnership and a Corporation
016. Analyze and describe the major differences in accounting procedures relating to partnerships and corporations.
01. Define selected business terms related to partnerships and corporations.
02. Identify and describe what three capital accounts are used by a corporation.
03. Explain how the adjustments for a corporation differ from the adjustments for a partnership.
*Revised Competency: Compare and interpret the differences in adjustments for a partnership.
Science Skill: Interpret data.
04. Explain how the income statement of a corporation differs from the income statement of a partnership.
Science Skill: Interpret data.
05. Explain how the balance sheet of a corporation differs from the balance sheet of a partnership.
Science Skill: Interpret data.
06. Record closing entries for a partnership.
07. Record closing entries for a corporation.

Accounting Control Systems
017. Analyze transactions made when using a voucher system.
01. Define selected terms relating to voucher systems.
02. Prepare vouchers correctly.
Science Skill: Understand the importance of accuracy and precision in scientific work.
03. Record vouchers in a voucher register and post in appropriate accounts in a ledger.
Science Skill: Understand the importance of accuracy and precision in scientific work.
Subcompetency: Demonstrate accuracy and precision when recording and posting vouchers.
04. Prepare checks correctly when a voucher system is used.
Science Skill: Interpret data.
Subcompetency: Interpret data necessary to prepare checks correctly using the voucher system.
05. Record payment of vouchers, checks, and deposits when a voucher system is used.

Science Skill: Understand the importance of accuracy and precision in scientific work.
Subcompetency: Demonstrate accuracy and precision when recording payment of vouchers, checks, and deposits.

06. Identify four typical applications of a voucher system.
07. Explain the advantages of using a voucher system.
Science Skill: Classify data.
Subcompetency: Identify the advantages of the voucher system by classifying materials used in transactions.

Inventory Control Systems

018. Analyze the importance of merchandise inventory control.
01. Define selected accounting terms relating to inventory control systems.
02. Determine the amount of inventory on hand through the use of physical and perpetual inventory.
03. Prepare stock cards when a manual system method is used for perpetual inventory records.
Science Skill: Classify data.
Subcompetency: Classify information needed for perpetual inventory records in a manual system.
04. Explain how cash registers and automated data processing equipment are used to prepare perpetual inventory records.
Science Skill: Observe.
Subcompetency:
1. Observe and interpret the use of the cash register and automated data processing equipment in preparing perpetual inventory records.
2. Explain how cash registers and automated data processing equipment operate.
05. Price inventory using fifo and lifo methods of pricing inventory.
Science Skill: Classify data.
Subcompetency: Classify differences in using the fifo and lifo methods of pricing inventory.
06. Determine rate of merchandise turnover.

Budgetary Control Systems

019. Analyze the importance of the preparation of a budget.
01. Define selected accounting terms relating to budgetary control systems.
02. Explain how budgets are used as management guides.
03. Identify sources of data for budgeting.
Science Skill: Classify data.
Subcompetency: Classify sources of data used for budgeting.
04. Use income and expense budget figures to prepare reports for management.
Science Skill: Classify data.
Subcompetency: Classify income and expense items in preparing reports.
05. Prepare a summary cash budget when estimated sales, purchases, and cash payments for expenses are given.
Science Skill: Classify data.
Subcompetency: Classify estimated sales, purchases, and cash payments and use them to prepare a summary cash budget.

Keeping Tax Records

020. Analyze the importance of keeping tax records.
01. Define selected accounting terms relating to tax records.
02. Record sales tax transactions in a sales journal and in a sales returns and allowances journal.
03. Record property tax correctly in a general journal.

Notes Receivable

021. Analyze accounting procedures used in recording notes receivable.
01. Identify the advantages of notes receivable over accounts receivable.
*Revised Competency: Classify information on notes receivable and accounts receivable to identify the advantages.
Science Skill: Classify data.
02. Record notes receivable and interest on notes in a general journal
03. Compute discounts on a non-interest-bearing notes receivable.
04. Record notes receivable correctly in a notes receivable register.
05. Calculate and record cash received for notes receivable correctly.

Science Skill: Understand the importance of accuracy and precision in scientific work.
Subcompetency: Demonstrate accuracy and precision in calculating and recording cash received.

Work Habits

022. Demonstrate desirable work habits when performing tasks relating to accounting occupations.

01. Write all numbers, letters, and words legibly.

02. Follow oral and written instructions accurately.
Science Skill: Understand the importance of accuracy and precision in scientific work.
Subcompetency: Perform accounting prededures according to instructions.

03. Adhere to schedules given.
Science Skill: Interpret data
Subcompetency: Recognize accounting tasks and follow a schedule to accomplish them.

04. Organize work station for performing tasks efficiently.
Science Skill: Classify data.
Subcompetency: Identify different work materials and tasks related to accounting occupations and organize them to work efficiently.

05. Locate errors and correct them.

Vocational Education Program: Home Economics Education
Course: Personal/Family Living Skills

COMPETENCY STATEMENTS ANALYZED FOR SCIENCE CONTENT
(Competency Goals and Performance Indicators K-12, Vocational Educational Supplement VEC - 1980. NC Department of Public Instruction, Raleigh, NC, 1980.

Value of Purposeful Activity to the Individual

001. Interpret value of purposeful activity to the individual.
Science Skill: Understand that a community is made up of interacting populations.
Subcompetency: Interpret value of work to the individual and society.

002. Recognize factors affecting occupational choices.

Relation of Personal Competencies to Vocational Planning

003. Interpret personal, educational, and financial decisions in vocational planning.
Science Skill:
1. Understand how scientists obtain knowledge.
2. Use data to predict outcome.
3. Understand the importance of using a scientific method as a way of solving everyday problems.
Subcompetency:
1. Demonstrate an understanding of a decision-making model.
2. Apply the scientific method in making decisions relative to vocational plans.
3. Predict the likelihood of success in various occupations.

004. Describe processes in seeking employment.

Creative Use of Leisure Skills in Employment and Service

005. Summarize benefits derived from the creative use of leisure.
Science Skill: Develop a positive attitude toward the use of scientific inquiry as a way to thinking and evaluating all human activity.
Subcompetency: Utilize observation and available data when selecting leisure time activities.

Preparation for Parenthood

006. Distinguish between myths and realities of parenthood.

007. Identify decision-making factors in family planning.
Science Skill:
1. Understand the importance of using a scientific method as a way of solving everyday problems.
2. Understand the implications of social/ethical biology.
3. Understand that the human body is composed of various systems with specific structures and functions.
Subcompetency:
1. Apply a scientific method in making decisions regarding family planning.
2. Identify social/ethical issues in contemporary society which must be considered in family planning such as birth control, abortion, and genetic engineering.
3. Recognize the scientific basis for various family planning methods.
4. Describe the female and male reproductive systems.

008. Identify parental responsibilities related to prenatal growth and development.
Science Skill:
1. Understand that all life comes from life (reproduction).
2. Understand that the human body is composed of various systems with structures and functions.
3. Understand the implications of social/ethical biology.
Subcompetency:
1. Describe the prenatal development of major structures of the body.
2. Explain terms related to pregnancy and prenatal development.
3. Explain the birth process.
4. Describe how viruses and bacteria may affect prenatal growth and development.

Note: The listing of science subcompetencies is comprehensive. Appropriate learning experiences should be selected based on student need.

5. Identify physiological effects of drugs (narcotics, alcohol and tobacco) on prenatal growth and development.

009. Identify community resources for information and assistance in family planning, pregnancy, and prenatal care.
Science Skill: Understand human reproduction.
Subcompetency: Explain the function and possible sources of genetic counseling.

010. Identify hereditary and environmental influences on human growth and development.
Science Skill: Understand that the basic unit of inheritance is DNA.
Subcompetency:
1. Explain the role of DNA in heredity.
2. Describe how genes vary in organisms.
3. Describe genetic mutation which may affect development.

Goals, Roles, and Responsibilities of Parenting

011. Identify goals for parenting which focus on maximizing the growth and development of all family members.
Science Skill: Understand that human beings exhibit a period of physical growth from infancy to adulthood but mental development continues throughout adulthood.
Subcompetency:
1. Identify the developmental stages.
2. Recognize that experiences in the early childhood years lay the foundation for mental and physical development.

012. Identify ways of coping with common problems in adjusting to parenthood.
Science Skill:
1. Infer from data.
2. Understand that human beings exhibit a period of physical growth from infancy to adulthood but mental development continues throughout adulthood.
Subcompetency:
1. Recognize parent-child interactions which have potential for conflict.
2. Recognize that constant adaptation is necessary because adults as well as children go through mental and psychological developmental stages.

013. Plan ways of meeting the basic need of infants and for encouraging growth and development.
Science Skill:
1. Understand that the human body is composed of various systems with specific structures and functions.
2. Understand that what is normal covers a wide range.
3. Understand viruses and bacteria.
Subcompetency:
1. Identify basic biological needs of infants.
2. Recognize the importance of good nutrition.
3. Describe ways to promote the development of the basic senses and motor skills.
4. Identify viruses and bacteria which are responsible for common childhood illnesses.

014. Identify implications for parenting based on the basic needs of children and the areas and stages of growth and development.
Science Skill:
1. Understand that human beings exhibit a period of growth from infancy to adulthood.
2. Understand that what is normal covers a wide range.
3. Interpret data displayed in tables and charts.
4. Develop a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity.
Subcompetency:
1. Describe the stages of development from infancy to adulthood.
2. Use critical judgement in interpreting growth charts.
3. Recognize the interrelationship of heredity, environment, and nutrition in their effects on growth and development.
4. Demonstrate critical thinking and scientific inquiry when selecting children's equipment and playthings.

5. Examine toys to determine their suitability for various developmental areas and stages.
6. Use critical judgement in identifying the parental roles required during each developmental stage.

015. Apply positive guidance principles and techniques with children.
Science Skill: Infer from data.
Subcompetency:
1. Demonstrate use of verbal and nonverbal behavior to transmit information to children of various ages.
2. Demonstrate the use of logic to make judgements needed in parent-child relationships.

016. Identify the interactions of the parent-child-situation relationship.
Science Skill:
1. Observe and classify.
2. Use data to predict.
Subcompetency:
1. Identify the similiarities and/or differences in various parent-child interactions.
2. Make predictions of the outcome of parent-child interactions.

017. Identify community resources available to families for information and assistance with problems related to children.

Wardrobe Selection for the Individual

018. Identify principles for selection, coordination, and care of personal clothing.
Science Skill:
1. Understand how light behaves.
2. Understand the difference between compounds and mixtures.
3. Understand that compounds can be altered to form different and new compounds.
4. Understand static electricity.
5. Understand the concept of matter.
6. Understand abrasion and pressure.
Subcompetency:
1. Recognize the chemical and physical properties of color.
2. Recognize basic chemistry involved in the process of dyeing fibers and fabrics.
3. Recognize the chemical and mechanical processes involved in producing hue, value, intensity, and tints and shades of color.
4. Describe recommended laundry procedures based on fiber content and finish.
5. Identify the function of various chemical agents found in detergents and other laundry products.
6. Describe safe use and disposal of laundry products.
7. Identify the physical and chemical properties of common stains and soils as a basis for correct laundrying procedures.
8. Determine the physical and chemical basis of common fabric care problems such as wrinkling, clinging, piling and shrinkage.

019. Demonstrate basic decision-making skills in purchasing clothing and accessories.
Science Skill:
1. Understand the importance of using a scientific method as a way of solving many everyday problems.
2. Perform experiments.
Subcompetency:
1. Apply the scientific method in making decisions in purchasing clothing and accessories.
2. Perform simple in-store tests to determine fabric stiffness, drape, and crease recovery of wearing apparel.

Construction of Clothing for the Individual

020. Select and coordinate appropriate patterns, fabrics and notions.

Science Skill:
1. Understand the importance of using a scientific method as a way of solving many everyday problems.
2. Understand that fibers can be synthesized.
3. Understand the nature of heat.
4. Ability to experiment.

Subcompetency:
1. Describe the fiber content and finishes commonly used for fabrics and wearing apparel.
2. Perform simple physical and chemical tests on fibers and fabrics.
3. Identify the thermal insulation properties of fabrics used in garments.
4. Recognize flammability procedures and standards for wearing apparel.
5. Apply the scientific method in selecting patterns, fabrics, and notions.

021. Select, operate, and care for sewing equipment safely and accurately.

Science Skill:
1. Understand that machines are devices that assist in doing work.
2. Understand that motion of an object can be described by its velocity and/or acceleration.
3. Understand magnetism.

Subcompetency:
1. Describe the mechanical operation of a sewing machine.
2. Describe how force, pressure, motion, and conduction are used during the ironing/pressing process.
3. Demonstrate magnetism using pins and needles.
4. Describe construction features of selected sewing equipment such as shears and ball point pins.

022. Peform basic techniques of garment construction and evaluate projects according to established criteria.

Science Skill:
1. Use measuring devices.
2. Understand the importance of accuracy and precision in work.

Subcompetency:
1. Select appropriate measuring equipment based on the construction feature.
2. Demonstrate accuracy and precision in computing, measuring, and constructing when working in the clothing laboratory.

Availability of Personal Resources

023. Identify available personal resources.

Science Skill: Ability to classify.

Subcompetency: Classify available personal resources into categories.

Factors Affecting Consumer Decisions

024. Describe influence of personal values, needs, and goals on consumer decisions.

Science Skill:
1. Classify data.
2. Formulate hypotheses.

Subcompetency:
1. Classify factors affecting consumer decisions as values, needs, or goals.
2. Identify biological needs which may affect consumer decisions.
3. Make consumer choices based on a sound hypothesis of outcome.

025. Identify social pressures on the consumer.

Science Skill: Develop a positive attitude toward the need for conservation, preservation, and wise use of resources.

Subcompetency: Show by action and thought, the need for people to conserve, preserve, and make wise use of resources.

026. Identify available sources of credit.

Science Skill:
1. Understand how scientists obtain knowledge.
2. Apply the scientific method.

Subcompetency: Apply the scientific method in collecting and interpreting information as to available sources and appropriate uses of credit.

Organization of Resources to Provide for Demands

027. Interpret processes in making and evaluating consumer decisions.

Science Skill: Interpret data.
Subcompetency: State logical conclusions when given a collection of consumer and product data.

028. Demonstrate management of financial resources to achieve personal goals.
Science Skill:
1. Control variables.
2. Formulate models.
3. Understand the importance of using a scientific method as a way of solving many everyday problems.
Subcompetency:
1. Identify financial resource variables and how they can be managed to achieve personal goals.
2. Use the scientific method in developing and using a sound, personal financial plan (budget).

Growth Toward Maturity

029. Describe family contributions to individual development of all family members.
Science Skill:
1. Understand that living things receive characteristics from parent organisms.
2. Understand that living things exist in a state of interdependence.
Subcompetency:
1. Distinguish between the biological and environmental contributions that families make to an individual's development.
2. Describe examples of parent-to-child, parent-to-parent and child-to-child relationships which show dependence of each family member on the other.

030. Interpet responsibilities and benefits of family membership at various stages of the life cycle.
Science Skill: Understand that human beings exhibit a period of growth from infancy to adulthood.
Subcompetency: Relate the periods of growth to the responsibilities and benefits associated with life cycle stages.

031. Show awareness of factors affecting individual life styles, personal goals, and values.
Science Skill: Understand the implications of humans in their environment.
Subcompetency:
1. Describe effects people have had and are having on the environment.
2. Assess personal values relative to moral and ethical issues such as world hunger, population control, alternative energy sources, pollution control, world resource allocation, and endangered species.

032. Describe influence of physical, mental, and emotional growth on personal behavior during puberty and adolescence.
Science Skill:
1. Understand human physiology.
2. Understand that what is normal covers a wide range.
3. Understand that most organisms have undergone changes through time.
Subcompetency:
1. Identify the major growth periods.
2. List the major organs composing the human body system and their function during puberty and adolescence.
3. Explain the role of organs and glands in regulating the body.
4. Describe biological differences in adolescents of this and previous generations.
5. Discuss the effects of diseases (nutritional, pathogenic, genetic) upon the physiology of the body.

Readiness for Roles in Contemporary Society

033. Interpret social interaction with peers and adults.
Science Skill:
1. Understand the importance of using the scientific method as a way of solving everyday problems.
2. Understand that an organism exhibits behavior (response to stimuli).

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Subcompetency: Identify basic behavior of humans (such as aggressiveness and offspring identification) which may be displayed in various social interactions and contrast these to animal behavior where applicable.

034. Summarize personal roles and responsibilities in dating, courtship, and engagement.
Science Skill:
1. Understand the importance of using the scientific method as a way of solving everyday problems.
2. Understand that all organisms exhibit behavior (response to stimuli).
Subcompetency:
1. Describe basic animal and human behavior such as courtship.
2. Use the scientific method when establishing personal standards for dating, mate selection, engagement, and marriage.

035. Describe changing male-female roles and responsibilities in contemporary society.
Science Skill: Develop a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity.
Subcompetency: Demonstrate critical thinking and the use of scientific inquiry in assessing changes in male-female roles and responsibilities in contemporary society.

Relation of Diet to Health and Appearance

036. Relate nutritional needs of teenagers to health and appearance.
Science Skill:
1. Become aware of various aspects of biochemistry.
2. Understand that life is a chemical process.
3. Understand that what is normal covers a wide range.
Subcompetency:
1. Recognize that food is composed of chemical components called nutrients.
2. Recognize that nutrition affects growth and maturation of individuals.
3. Identify basic functions of nutrients in the body and relate to health and appearance.

037. Demonstrate use of the principles of nutrition in food selection.
Science Skill:
1. Classify data.
2. Understand that life is a chemical process.
3. Become aware of various aspects of biochemistry.
4. Understand that the energy available from food is expressed as calories.
5. Understand human physiology and anatomy.
6. Understand that the body is composed of various systems with specific structures and functions.
7. Understand that what is normal covers a wide range.
Subcompetency:
1. Classify foods into basic food groups.
2. Identify foods and groups of foods as good sources of various nutrients.
3. Recognize the functions that various nutrients serve in the body.
4. Describe the chemical and mechanical nature of digestion and metabolism.
5. Explain the calorie and its function in the body.
6. Contrast the body's fuel consumption to that of a machine.
7. Determine nutritionally sound food patterns and weight reduction plans.
8. Identify ways to retain the nutritive value of food.
9. Understand role of proteins, carbohydrates, fats, vitamins, and minerals in nutrition.

Management of Resources in Food Preparation

038. Identify principles of meal planning.
Science Skill:
1. Understand compounds and mixtures.
2. Understand that compounds can be altered to form different and new compounds.
3. Recognize various classes of matter.
4. Understand the nature of heat.
5. Understand the importance of using a scientific method as a way of solving everyday problems.
Subcompetency:
1. Describe ways to retain color in food preparation.
2. Describe the effect of certain chemical compounds (acids) on food colors.

3. Identify the effect heat can have on the physical and chemical composition of food.
4. Recognize the effect temperature has on the desirability of foods.
5. Recognize the effect heat has on the nutrition of food.
6. Use the scientific method when planning meals to meet specific family needs.

039. Interpret the use of time, energy, and money in the management of meals.

Science Skill:
1. Develop a positive attitude toward the contribution of science and technology in shaping the world - adverse as well as beneficial effects.
2. Develop a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity.

Subcompetency:
1. Identify technological advances in food and the food industry such as ways of producing, processing, transporting, and preparing food.
2. Analyze the use of additives and other chemicals in the processing of food.
3. Analyze various tasks performed in food preparation to determine efficient use of time and energy.
4. Use the scientific method in making decisions regarding the use of time, energy and money in management of meals.

040. Select, use, and care for equipment properly.

Science Skill:
1. Develop a positive attitude toward the contributions of science and technology.
2. Understand that energy is the ability to do work.
3. Understand that machines are devices that assist in doing work.
4. Understand that electrical energy can be converted into heat and light.
5. Understand force, energy, and motion.
6. Understand that the characteristics of materials used in equipment are determined by their chemical properties.
7. Demonstrate skill in the use and care of instruments.
8. Understand the need to conserve energy.

Subcompetency:
1. Relate the principles of force, motion, pressure, and gravity to the construction and operation of small utensils and equipment.
2. Recognize the unique principles of physics that kitchen shears (first order lever) and nut crackers (second order lever) incorporate.
3. Recognize the energy source of major pieces of large kitchen equipment.
4. Describe how heat, temperature, evaporation, and pressure function and interact in the operation of certain small appliances.
5. Use both Celsius and Fahrenheit thermometers and thermostats in food preparation.
6. Recognize the method of heat used in various ranges and ovens.
7. Identify construction materials and construction features (such as capacity, conduction, heat transfer, and insulation) of various cooking utensils and equipment.
8. Uses scales to weigh foods.
9. Demonstrate the use and care of utensils, small appliances, and equipment needed for meal preparation.

041. Identify work space for food preparation.

Science Skill:
1. Observe and classify.
2. Understand human anatomy.

Subcompetency:
1. Classify the jobs performed in the kitchen as to their work centers.
2. Analyze food preparation and storage space in relation to the size and height of individuals using the facility.

042. Plan, prepare, and serve selected foods.

Science Skill:
1. Understand characteristics which are the basis for classifying plants and animals.
2. Identify examples of food chains.
3. Use the scientific method in both laboratory work and solving everyday problems.
4. Use measuring devices.
5. Recognize chemistry as an experimental science.
6. Be familiar with evidence of chemical change.
7. Be familiar with the concept of conservation of matter and energy.

8. Understand the relationship between matter and energy for both chemical and physical changes.
9. Be familiar with factors affecting the rate of a reaction.
10. Recognize the importance of acids, bases, and salts in industry and in the home.

Subcompetency:

1. Classify meats and selected protein foods according to animal or vegetable sources from which they are obtained.
2. Classify fruits and vegetables according to the particular part or kinds of plants from which they are obtained.
3. Recognize cooking as a chemical process similar to the process of human digestion.
4. Explain chemical and physical reactions which affect the digestability, texture, flavor, and nutritional value of food when it is cooked.
5. Describe the specific chemical and physical effects of processing and cooking various groups of foods.
6. Examine the chemical and physical reactions caused by specific dry and moist cooking methods.
7. Identify the boiling and melting point of selected liquids and solids.
8. Recognize the importance of temperature in preparing, serving, and storing food.
9. Describe the effect of atmospheric pressure and altitude on baking.
10. Describe how air, steam, and carbon dioxide work as leavening agents.
11. Describe the scientific basis for selected food preparation processes such as emulsions, stabilizing, thickening, coagulation and mixing.
12. Describe the chemical and physical effects of sweetening agents when incorporated in a product.
13. Describe chemical reactions caused by selected acids, salts, and alkaline substances in food preparation.
14. Identify physical and chemical changes in food which may take place during storage.

043. Demonstrate manners for family meals and special occasions.

Grooming and Personal Appearance

044. Describe cultural differences related to personal grooming.

Science Skill:

1. Understand human anatomy.
2. Understand that each organism has special structures by which it adapts to its surroundings.

Subcompetency: Describe physical changes which have occurred in individuals of different cultures due to grooming practices.

045. Show awareness of value bases for personal grooming standards.

Science Skill:

1. Understand the importance of caring for the body through proper nutrition, health, and sanitary practices.
2. Understand human anatomy and physiology.
3. Develop a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity.
4. Understand that what is normal covers a wide range.
5. Understand the importance of using a scientific method as a way of solving everyday problems.

Subcompetency:

1. Demonstrate critical thinking in making decisions about personal grooming standards.
2. Summarize the contributions of exercise, sleep, rest, and diet to appearance.

046. Demonstrate selected techniques in personal grooming.

Science Skill:

1. Understand human anatomy and physiology.
2. Describe how disease-causing organisms enter the body such as through water, food, air, and skin.

Subcompetency:

1. Identify physical changes which take place during adolescence and how the changes affect grooming standards and practices.
2. Describe parts of the body such as hair, skin, and feet which require special hygiene practices.
3. Explain the scientific basis for grooming practices such as regular baths and care of the teeth.
4. Relate special health problems to poor personal hygiene practices.

5. Differentiate between grooming practices needed for various skin types and racial groups.

047. Interpret factors involved in the selection and cost of grooming aids and services.

Science Skill:
1. Understand compounds and mixtures.
2. Recognize classes of matter.
3. Be familiar with evidence of chemical change.
4. Understand common formulas.
5. Understand physiology.
6. Understand viruses, bacteria and fungi.
7. Know basic laws of force and motion.
8. Understand the importance of using the scientific method as a way of solving everyday problems.
9. Develop a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity.

Subcompetency:
1. Identify the chemical components that are standard ingredients in common grooming aids.
2. Recognize Food and Drug Administration standards for cosmetics and other grooming aids.
3. Identify reactions and side effects which may occur with the use of common grooming aids.
4. Recognize the physical and chemical breakdown of cosmetics which may occur during extended periods of shelf life and use.
5. Compare the effectiveness of grooming aids based on ingredients and cost.
6. Develop personal grooming aids using safe household products as ingredients.
7. Examine myths and false claims associated with various grooming products.
8. Explain scientific terms commonly used in packaging and advertising grooming products.
9. Demonstrate critical thinking and the use of scientific inquiry in making decisions regarding selection of grooming aids and services.

Factors Affecting Family Housing

048. Identify factors affecting family housing.
Science Skill: Understand the importance of using a scientific method as a way of solving everyday problems.
Subcompetency: Use the scientific method in making decisions regarding family housing and the energy efficiency of homes.

Use of Design Principles in the Home

049. Describe basic principles of art and design in the home.
Science Skill: Understand how light behaves.
Subcompetency:
1. Explain the role of light in color theory.
2. Relate measurement of light to amount of light needed for various areas of the home.

050. Describe how to arrange furniture for function and beauty.
Science Skill:
1. Understand that work, energy, and power are related concepts.
2. Understand how light behaves.
3. Understand human anatomy and physiology.
Subcompetency:
1. Relate work, energy, and power to furniture arrangement.
2. Describe the effect improper lighting has on the eyes and body.
3. Relate furniture size, height, depth, and location to the effect it has on the physiology of the body.

Care of Furniture, Equipment, and Accessories

051. Relate factors involved in the selection and use of household textiles and accessories.
Science Skill:
1. Understand that fibers can be synthesized from organic compounds.
2. Understand the importance of plastics in our modern society.
3. Classify data.
4. Develop a positive attitude toward the contributions of science and technology in shaping the world.
5. Understand how light behaves.
6. Understand the basic characteristics of plants.
7. Understand that different kinds of matter have characteristic properties.

Subcompetency:
1. Classify fibers as natural or manmade.
2. Describe characteristics of synthetic fibers and fabrics.
3. Identify characteristics of different kinds of matter such as wood, metal, glass, and fabric.
4. Identify properties desired in common household textiles and materials used in furniture, equipment, and accessories.
5. Develop a lighting plan which considers illumination, color, and reflection properties of room surfaces.
6. Identify the thermal conduction and sound absorption capacity of carpet, upholstery, and other textiles used in furnishing homes.

052. Demonstrate methods for organizing household storage.
Science Skill:
1. Observe and classify.
2. Understand human anatomy and physiology.
Subcompetency:
1. Identify the similarities and/or differences in items to be stored.
2. Describe the effect that improperly located storage space may have on the body.
3. Describe the proper procedure for lifting, reaching, and bending when getting or replacing stored items.

053. Describe care of furniture, equipment, and accessories.
Science Skill:
1. Understand the concept of matter.
2. Understand that fibers can be synthesized.
3. Understand the importance of plastics to modern society.
4. Understand how light behaves.
5. Understand the basic laws of force and motion.
6. Understand work, energy, and power as related concepts.
7. Perform experiments.
8. Use instruments.
Subcompetency:
1. Identify ways cleaning preserves surfaces.
2. Describe physical and chemical properties of materials found in household furniture, equipment, and surfaces.
3. Distinguish between the hardness of various natural and synthetic surfaces.
4. Recognize the effects of light, moisture, and abrasion on wood, fabrics, and other surfaces found in the home.
5. Identify physical, chemical, and mechanical cleaning methods.
6. Describe how friction, force, pressure, agitation, and temperature function in performing various cleaning tasks.
7. Identify the function that selected chemical components perform in various cleaning products.
8. Contrast the chemical components of cleaning products used for similar cleaning tasks such as cleaning waxed and nonwaxed floors.
9. Identify common household products such as ammonia which can be substituted for commerical cleaning agents.
10. Experiment with various methods of performing selected household tasks to determine the most efficient in terms of time, motion, and energy.
11. Demonstrate proper care of furniture, equipment, and accessories.

Correction of Safety Hazards in and Around the Home

054. Demonstrate techniques for correction of safety hazards in and around the home.
Science Skill:
1. Describe how disease-causing organisms enter the body.
2. Understand the concept of matter.
3. Understand that compounds can be altered to form different and new compounds.
4. Understand that people interact with the environment and produce change.
5. Know that the earth's environment is fragile and easily damaged.
6. Be familiar with the evidence of chemical change.
7. Understand human anatomy and physiology.
8. Understand force and motion.
9. Understand work, energy, and power.
10. Be familiar with physical changes such as phase changes.
11. Understand the concept of heat transfer.
12. Understand electrical energy.

Subcompetency:

1. Describe ways to prevent bacterial contamination in the bath, kitchen, and other parts of the house.
2. Identify hazardous chemical components of household and garden products.
3. Recognize the potential for contamination and pollution caused by improper use and disposal of various household and garden products.
4. Identify hazardous chemical reactions which can occur when certain cleaning products such as bleach and ammonia are combined.
5. Describe the body mechanics recommended for moving large items.
6. Recognize the role of force, balance, and height in the incidence of household falls and injuries.
7. Relate burns to heat source.
8. Recognize proper insulation as a means of preventing shock and burns.
9. Use knowledge of basic circuitry to identify, prevent, and correct electrical safety hazards in the home.

Vocational Education Program: Home Economics Education
Course: Foods/Nutrition (Working Title)

COMPETENCY STATEMENTS ANALYZED FOR SCIENCE CONTENT
(Competency Goals and Performance Indicators K-12, Vocational Educational Supplement VEC - 1980. NC Department of Public Instruction, Raleigh, NC, 1980.)

(Competencies 042-051 from 7122, Advanced Consumer and Homemaking)

Difference in Food Needs of Family Members

001. Analyze factors affecting food decisions.
Revised Competency: Use the scientific process in analyzing factors affecting food decisions.

002. Analyze variations in food selection to meet nutritional needs of family members.
Science Skill:
1. Understand that life is a chemical process.
2. Become aware of various aspects of biochemistry.
3. Understand that the energy available from foods is expressed as calories.
4. Understand that human beings exhibit a period of growth from infancy to adulthood.
5. Understand human physiology and anatomy.
6. Understand that the human body is composed of various systems with specific structures and functions.
7. Understand that what is normal covers a wide range.
Subcompetency:
1. Recognize that nutrition affects growth and maturation of individuals.
2. Recognize that food is composed of chemical components called nutrients.
3. Recognize the chemical names and functions of the different nutrients.
4. Perform simple tests to identify biochemical compounds such as fats, proteins and carbohydrates.
5. Describe major biochemical reactions which occur in the human body such as digestion and cellular metabolism.
6. Describe the major structures and functions of the digestive system.
7. Explain how food is used to meet energy, maintenance and growth needs of different family members.
8. Interpret charts which give caloric ranges needed for major developmental stages.
9. Recognize the effects of excess amounts or deficiencies of certain nutrients and other consumed substances on the development and functioning of the body.

Use of the Food Dollar

003. Interpret legal aspects of consumer protection in the area of foods and nutrition.
Science Skill:
1. Understand that life is a chemical process.
2. Understand the implications of social/ethical biology.
3. Understand the nature of micro-organisms such as viruses, bacteria, mold and yeast.
Subcompetency:
1. Examine the use of chemical substances, hormones and antibiotics in growing, producing and processing food products.
2. Analyze food products to determine whether their chemical components occur naturally or are additives.
3. Analyze food products to determine the purpose and benefit of any additives.
4. Identify illnesses caused by viruses or bacteria transmitted in food handling.
5. Develop a positive attitude toward the contributions of science and technology in evaluating food composition.

004. Evaluate practices in shopping for food.
Science Skill:
1. Explain how light behaves.
2. Understand the importance of using a scientific method as a way of

NOTE: The listing of science subcompetencies is comprehensive. Appropriate learning experiences should be selected based on student need.

solving many everyday problems.

Subcompetency:

1. Explain how light (color, optical illusion, reflection, refraction, waves) is used in marketing food.
2. Apply the scientific method in comparative food shopping.

005. Demonstrate skill in the conservation and preservation of selected foods.

Science Skill:

1. Understand the nature of micro-organisms such as viruses, bacteria, mold and yeast.
2. Understand heat energy.
3. Understand that pressure applied on a confined liquid is transmitted equally and in every direction.
4. Develop a postive attitude toward the conservation, preservation and wise use of natural resources.

Subcompetency:

1. Identify the micro-organisms involved in contamination and spoilage of food.
2. Explain the process of food poisoning.
3. Identify illnesses caused by unsafe practices in preserving food.
4. Explain factors such as heat, chemicals, presence of oxygen and dryness which affect the growth of bacteria in food.
5. Compare food hygiene procedures which encourage and inhibit the growth of bacteria.
6. Determine the role of temperature and pressure in food preservation when using sterilization and refrigeration methods.
7. Explain pasteurization.
8. Discuss evaporation and condensation as related to food preservation techniques.
9. Explain the use of chemical substances such as salt, vinegar and alcohol in preserving food.
10. Analyze the use of various food additives such as bleaching agents, antioxidants, emulsifiers and colorings in processing and preserving foods.
11. Explain chemical changes in foods that may occur during preservation and storage.
12. Show, by action and thought, the need for people to conserve, preserve and make wise use of food resources.

Advanced Food Preparation

006. Interpret changes in foods and nutrients during preparation and processing.

Science Skill:

1. Be familiar with physical and chemical changes and the characteristics of each.
2. Be familiar with the evidence of chemical change in liquids, solids and gases due to temperature.
3. Understand heat energy.
4. Understand the concept of gravity, velocity and friction.
5. Identify the oxidation and reduction components of a chemical reaction.

Subcompetency:

1. Distinguish between physical and chemical changes (such as crystallization, emulsion, osmosis, etc.) which take place when cleaning, processing, cooking, freezing and storing foods.
2. Explain the role of enzymes and other catalysts in food preparation and processing.
3. Explain the importance of the pH value in food preparation.
4. Explain the effect of water on starch.
5. Explain the effect of heat and agitation in protein, carbohydrate, vitamin and fat cookery.
6. Explain what effect the incorporation of air, carbon dioxide and steam has in the preparation of foods.
7. Explain what occurs in the process of browning foods.

007. Modify quantities and ingredients in recipes for specific use.

Science Skill:

1. Understand the importance of accuracy and precision in scientific work.
2. Understand how air pressure varies from sea level to higher altitudes.
3. Use numbers.

Subcompetency:

1. Recognize the changes which may occur when amounts and/or proportions of ingredients are altered in recipes.
2. Demonstrate critical thinking when recipe modification is needed.

3. Explain the effect atmospheric pressure and altitude have on the choice and quantity of ingredients used in selected recipes.

008. Use specialized and improvised equipment in the preparation and service of food.

Science Skill:

1. Develop a positive attitude toward the contributions of science and technology.
2. Understand that energy is the ability to do work.
3. Understand that machines are devices that assist in doing work.
4. Understand that electrical energy can be converted into heat and light.
5. Understand force, energy and motion.
6. Understand that the characteristics of materials used in equipment are determined by their chemical properties.
7. Demonstrate skill in the use and care of instruments.
8. Understand the nature of heat.

Subcompetency:

1. Examine the principles of force, motion, pressure, gravity, levers, etc., as they relate to the selection and use of equipment for food preparation.
2. Define terms such as mass, density, volume, gravity and weight which will aid in understanding the construction and use of different cooking utensils.
3. Recognize ways in which different kinds of energy (chemical, heat, electrical, mechanical, etc.) may be utilized in food preparation equipment.
4. Explain the importance of considering surface tension when selecting and using pans and other cooking utensils.
5. Describe how heat, temperature, evaporation and pressure function and interact in the operation of certain appliances such as coffee makers and pressure cookers.
6. Use both Celsius and Fahrenheit thermometers and thermostats in food preparation.
7. Explain convection, conduction and radiation heat transfer methods and describe cooking characteristics of each.
8. Analyze the construction features of various cooking utensils and equipment considering heat transfer, conduction, insulation and capacity.
9. Identify the physical principles of absorption, compression and mechanical agitation necessary for the operation of refrigerators, freezers and ice cream makers.
10. Use scales to weigh foods.

009. Analyze management of resources in meal preparation and service.

010. Demonstrate appropriate variations in table service and appointments for specific purposes and occasions.

(Competencies 001-014 from 7152, Advanced Foods/Nutrition)

Food Patterns and Customs

011. Analyze regional and cultural differences in food patterns and preparation.

Science Skill:

1. Understand that living things receive characteristics from the parent organism(s).
2. Understand human physiology.
3. Understand the implications of humans in their environment.
4. Understand that people interact with the environment.

Subcompetency:

1. Discuss the effect of heredity and environment on food preference.
2. Analyze the food consumption patterns of different regional and cultural groups to determine alternative food sources of basic nutrients.
3. Explain the effect of over-consumption of large amounts of culturally accepted foods on the diet.
4. Analyze the nutritional, pathogenic, genetic and developmental ramifications of non-traditional food consumption patterns.
5. Determine the specific chemical, physical or mechanical process which is involved in the preparation and processing of unique regional or cultural dishes.
6. Analyze factors that are causing regional and cultural differences to become less distinct.

7. Accept unique regional and cultural food consumption practices which are determined to be nutritionally sound.

012. Evaluate food fads and fallacies.

Science Skill:

1. Understand human physiology.
2. Become aware of various aspects of biochemistry.
3. Develop a positive attitude toward the use of scientific inquiry as a way of evaluating all human activity.
4. Accept that uncertainties underlie many of the so-called laws of science.
5. Understand that what is normal covers a wide range.

Subcompetency:

1. Analyze common fallacies concerning food preparation and consumption using both scientific data and the scientific method.
2. Determine the nutritional soundness of popular diets and food consumption patterns as to their ability to meet the physical needs of the body.
3. Determine the possible nutritional repercussions of food fads using scientific data and the scientific method.
4. Accept unique food consumption patterns which are determined to be nutritionally sound.

013. Describe variations in nutritional needs during developmental stages.
(See 002)

Technology and Consumer Choices

014. Analyze scientific and technological developments in the food industry.

Science Skill:

1. Develop a positive attitude toward the contributions of science and technology in shaping the world - adverse as well as beneficial effects.
2. Develop a positive attitude toward the role of science in helping people meet their responsibilities to society.
3. Develop a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating.
4. Understand the concept of energy.
5. Understand that heat can be transferred from one object to another.
6. Understand the need for energy conservation.

Subcompetency:

1. Identify technological developments and synthetic materials used in food preparation and service equipment and in producing, processing, manufacturing and packing food products.
2. Compare natural, substitute, synthetic and engineered foods.
3. Examine controversial issues (use of additives, presence of carcinogens, gentic engineering, etc.) which may have scientific and technological applications in the food industry.
4. Describe how scientific and technological developments have impacted on energy use and conservation in the food industry.
5. Examine the effects that new food preparation techniques have on the nutritional value and digestibility of common foods.

015. Analyze sources of consumer information and protection.

Management of the Food Dollar

016. Analyze budgeting patterns and buying practices in management of food dollar.
(See 003 and 004)

017. Analyze techniques of conservation and preservation.
(See 005)

Organization and Management of Kitchen Facilities and Equipment

018. Demonstrate principles of organization and management for kitchen facilities and equipment.

Science Skill:

1. Understand that electrical power is the rate at which electrical energy is consumed.
2. Understand that electrical energy can be converted into heat and light.
3. Understand that fossil fuels are finite and energy conservation is essential.
4. Understand the concept of energy.

5. Know the basic causes and effects of air pollution.

Subcompetency:

1. Estimate the cost of electrical energy when selecting energy saving kitchen equipment.
2. List ways of conserving electrical and heat energy in kitchen planning.
3. Examine the principles of force, motion, pressure, gravity, levers, work, illumination, humidity, etc., as they relate to the selection, location and design of kitchen equipment and facilities.
4. Identify ways in which human energy and other resources can be conserved when using kitchen facilties and equipment.
5. Describe ways to reduce the level of water, land and air pollution in food preparation, storage and disposal areas.

Creativity in Meal Planning and Preparation

019. Interpret variations in meal patterns to meet special nutritional needs. (See 002, 011, and 012)

020. Demonstrate principles and specialized techniques of food preparation. (See also 006 and 007)

Science Skill:

1. Understand the physiology of plants and animals.
2. Understand characteristics which are the basis for classifying plants and animals.
3. Identify examples of food chains.
4. Use measuring devices.
5. Understand the scientific method.

Subcompetency:

1. Classify various meats, fruits and vegetables which are commonly used as food sources.
2. Recognize the relation between the configuration of various animals and the desirability of cuts of meats.
3. Identify the various cellular and structural composition of vegetables and fruits and group them according to recommended food preparation techniques.
4. Explain how the preparation and cooking process may change the chemical and physical structure of certain foods.
5. Identify how factors such as water, temperature and oxygen affect nutrition in food preparation.
6. Recognize the chemical basis of flavor, aroma and taste and how these factors relate to food preparation and consumption.
7. Identify ways that flavor, color, texture and nutrients may be destroyed or retained during preparation of food.
8. Analyze the scientific basis of different cooking methods such as baking, frying and boiling.
9. Distinguish between dry heat and moist heat cooking methods.
10. Describe the chemical and physical composition and function of leavening agents, fats, acids, sugar, etc., in food preparation.
11. Explain the specific biological, chemical and physical processes used to prepare selected speciality foods such as sourdough bread, cheeses and souffles.
12. Use appropriate devices and units of measurement to gauge quantities of ingredients, temperature and time when preparing food.
13. Modify or create a recipe using knowledge of the chemical properties and rules for proportioning and combining ingredients.

021. Evaluate management of resources in preparation and service of meals.

022. Demonstrate preparation of regional and cultural food specialties. (See 011 and 020)

023. Identify foods for home and community emergencies. (See also 005)

Science Skill: Understand the implications of social/ethical biology.

Subcompetency:

1. Relate issues such as world hunger and catastrophes (flood, drought, etc.) to emergency food supplies.
2. Identify the effect of natural catastrophes on the need for proper food and water storage.

Career Opportunities in Foods and Nutrition

024. Identify career opportunities in foods and nutrition.

Vocational Education Program: Marketing and Distributive Education
Course: Marketing (New List)

COMPETENCY STATEMENTS ANALYZED FOR SCIENCE CONTENT*

001. Describe the basic content and organization of the Marketing and Distributive Education program.

002. Explain the value of the Distributive Education Clubs of America (DECA) as an integral part of the Marketing and Distributive Education program.

003. Explain marketing and its importance.
Science Skill: Know that the earth is a closed system in space with limited resources.
Subcompetency: Recognize which resources are renewable and nonrenewable and that there is a direct relationship between price and the availability of resources.

004. Set personal goals.
Science Skill:
1. Understand how scientists obtain knowledge.
2. Use data to predict.
3. Understand the importance of using a scientific method as a way of solving everyday problems.
4. Develop a positive attitude toward the role of science in helping people meet their responsibilities to society.
Subcompetency:
1. Demonstrate an understanding of a decision-making model.
2. Apply the scientific method in making decisions relative to vocational plans.
3. Predict the likelyhood of success in various occupations.

005. Maintain appropriate personal appearance.
1. Understand human anatomy and physiology.
2. Understand that each organism has special structures by which it adapts to its surroundings.
Subcompetency:
1. Identify physical changes which take place during adolescence and how the changes affect grooming practices.
2. Describe parts of the body such as hair, skin and feet which require special hygiene practices.
3. Explain the scientific basis for grooming practices such as regular baths and care of the teeth.

006. Prepare for and complete a job interview.

007. Develop personality traits/work habits important to business.
Science Skill: Understand human behavior (all organisms exhibit behavior.)

008. Communicate effectively with customers, co-workers and supervisors.

009. Use telephone in business-like manner.

010. Explain the importance of human relations in business.
Science Skill: Understand that human beings exhibit a period of physical growth from infancy to adulthood but mental development continues throughout adulthood.
Subcompetency:
1. Recognize interactions which have potential for conflict.
2. Recognize that constant adaptation is necessary because adults as well as children go through mental and psychological developmental stages.

011. Work cooperatively with fellow employees, supervisors and management.

012. Recognize that management, supervisors and employees require a framework of policies within which to operate.

NOTE: 1. The listing of science subcompetencies is comprehensive. Appropriate learning experiences should be selected based on student needs.
*2. Competency statements provided by Marketing and Distributive Education Section, Division of Vocational Education, North Carolina Department of Public Instruction.
**3. Required science skill indicated in original competency statement.

013. Communicate suggestions, progress and problems to management.

014. Identify purposes of staff meetings and other forms of inter-departmental/company communications.

015. Explain the concept of economics and economic activities.
Science Skill: Understand the implications of humans in their environment.
Subcompetency:
1. Describe effects people have had and are having on the economy.
2. Assess personal values relative to economic issues and trends.

016. Explain the concept of supply and demand.
(See 015)

017. Explain the concept of profit/profit motive.
Science Skill:
1. Understand how scientists obtain knowledge.
2. Use data to predict.
3. Understand the importance of using a scientific method as a way of solving everyday problems.
4. Develop a positive attitude toward the role of science in helping people meet their responsibilities to society.
Subcompetency:
1. Demonstrate an understanding of a decision-making model which is appropriate for management decisions.
2. Apply the scientific method in making decisions relative to risk.
3. Predict the likelihood of profit, loss and risk in various situations.

018. Explain the concept of risk.
(See 017)

019. Explain the concept of competition.
(See 017)

020. Explain the concept of private enterprise and business ownership.

021. Explain marketing functions and related activities.

022. Explain the nature of channels of distribution.

023. Explain the concept of market and market identification.

024. Explain the concept of utility.

025. Explain the relationship of business, government and consumers.

026. Explain the purpose and importance of selling.

027. Represent the business favorably to customers and outside business associates.

028. Use merchandise information.
Science Skill:
1. Understand how light behaves.
2. Understand that light exhibits both wave and particle properties.
3. Understand the difference between compounds and mixtures.
4. Understand static electricity.
5. Understand the concept of matter.
6. Understand abrasion and pressure.
7. Understand the basic characteristics of plants.
8. Understand that fibers can be synthesized from organic compounds.
9. Understand the importance of using a scientific method as a way of solving many everyday problems.
10. Perform experiments.
Subcompetencies:
1. Recognize the chemical and physical properties of color.
2. Recognize basic chemistry involved in the process of dyeing fibers and fabrics.
3. Recognize chemical and mechanical processes related to producing hue, value, intensity and tints and shades of color.
4. Describe recommended laundry procedures based on fiber content and finish.
5. Identify the physical and chemical properties of common stains and soils as a basis for correct laundrying procedures.

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6. Determine the physical and chemical basis of common fabric care problems such as wrinkling, clinging, piling and shrinkage.
7. Apply the scientific method in making decisions relative to information used in selling clothing and accessories.
8. Perform simple in-store tests to determine fabric stiffness, drape, and crease recovery of wearing apparel to be used with customers.

029. Explain the role of special customer services such as wrapping and packaging, mail and telephone services, and delivery systems.

030. Identify sources of merchandise information.
Science Skill: Observe and identify.

031. Determine when to approach a customer to open a sale.
Science Skill: Observe and interpret data.

032. Open the sales presentation.

033. Determine customer/client needs and buying motives.
Science Skill: Observe and interpret data.

034. Use feature/benefit selling.
Science Skill: Understand the importance of using a scientific method as a way of solving many everyday problems.
Subcompetency: Use the scientific method to make effective buying decisions when helping customers during a sale.

035. Demonstrate product.

036. Handle customer/client objections.

037. Close the sale.

038. Use suggestion selling.

039. Recognize accurate mathematical calculations are essential to profitable business operations.
Science Skill: Use numbers.

040. Solve mathematical problems of addition, subtraction, multiplication, division, and those involving fractions and percentages.
Science Skill: Use numbers.

**041. Utilize and interpret information from tables, graphs and charts.

042. Complete sales checks for cash and charge transactions.
Science Skills: Use numbers.

043. Operate register/P.O.S. terminal.
Science Skill: Understand that machines are devices that assist in doing work.

044. Accept customer/client checks.

045. Inspect for counterfeit currency.

046. Make change.

047. Process special transactions essential to offering customer/client services, such as: layaways, COD's, trading stamps, coupons and refunds/exchanges.

048. Wrap/Package products.

049. Explain shoplifting prevention policies/procedures.

050. Explain use of purchase order and invoice.

051. Explain receiving procedures.

052. Receive merchandise.

053. Check incoming stock.

054. Mark stock.

055. Explain the nature of reserve, forward and under stock.

056. Explain stock control procedures.

057. Complete the stock count.

058. Explain routine security procedures.

059. Explain functions of store maintenance.

060. Explain emergency procedures and safety precautions.
Science Skill: Understand the importance of using a scientific method as a way of solving many everyday problems.
Subcompetency:
1. Understand the purpose and procedure for assigned tasks.
2. Follow conduct and safety rules.

061. Differentiate between merchandise promotion and institutional promotion.

062. Explain the concept of promotional mix.

063. List the purposes of publicity.

064. List the purposes of advertising.

065. Identify the types of media.

066. Identify the parts of a print advertisement.

067. Explain the use of visual merchandising.

068. List the common types of displays.

069. Explain how to assemble, maintain and dismantle displays.

070. Maintain awareness of current business promotional activities.

071. Apply appropriate leadership style.
Science Skill: Understand the importance of using a scientific method as a way of solving everyday problems.

072. Use time management principles.
Science Skill:
1. Control variables.
2. Formulate models.
3. Understand the importance of using a scientific method as a way of solving many everyday problems.
Subcompetencies:
1. Identify resource variables and how they can be managed to achieve personal goals.
2. Use the scientific method in developing and using a sound time management plan.
3. Use the scientific method in making decisions regarding the use of time, energy and money.

073. Plan and organize work.
(See 072)

074. Determine hiring needs.

075. Explain techniques for recruiting new employees.

076. Interview/Select new employees.(same as competency 139)

077. Orient new employees.

078. Explain the nature and importance of employee training/human resource development.
Science Skill: Understand human physiology.
Subcompetency:
1. Identify the functions of the major body systems.
2. Recognize the importance of taking preventive measures to maintain good health necessary for effective job performance.

079. Select and use the methods of training best suited to individual situations.(same as competency 140)

080. Plan and develop a work force budget and schedule employees.(same as competency 141)

081. Develop a personnel organization plan.
(See 072)

082. Explain the procedure for assigning duties and delegating authority.

083. Give directions for completing job tasks.
Science Skill: Understand the importance of using a scientific method as a way of solving everyday problems.
Subcompetency:
1. Understand the purpose and procedure for completing job tasks.
2. Follow conduct and safety rules.
3. Interpret results of completed job tasks.

084. Conduct staff meetings.(same as competency 144)

085. Explain the concept of staff motivation.

086. Explain ways to build employee morale.(same as competency 143)

087. Evaluate employees.

088. Handle employee complaints and grievances.(same as competency 142)

089. Identify target markets.
Science Skill: Use data to predict.
Subcompetency: Forecast items which will maximize sales.

090. Identify and interpret trends and economic indicators.
Science Skill:
1. Interpret data.
2. Understand that machines are devices that assist in doing work.
Subcompetency:
1. Analyze product data.
2. Explain the role of machines in the economy.

091. Select appropriate products.(same as competency 146)
Science Skill: Interpret data.
Subcompetency: Interpret consumer demand data.

092. Prepare merchandising/buying plans.(same as competency 145)
Science Skill:
1. Use numbers.
2. Use data to predict.
3. Formulate models.

093. Maintain vendor information and select appropriate vendors.

094. Place or cancel routine (re)orders.

095. Determine selling price.

096. Maintain inventory control system.

097. Interpret profit and loss statements.
Science Skill: Interpret data.

098. Explain the concept of marketing strategies.
Science Skill: Use data to predict.
Subcompetency: Predict the relationships between merchandise information, sales and promotion.

099. Explain the concept of promotional mix.

100. Coordinate promotional activities.

101. Select merchandise for promotion.

102. Select promotional media.

103. Describe ways to stimulate sales with timely advertising, markdowns, special sales and sales force incentives.

104. Promote through publicity/public relations and personal involvement in community and professional organizations.

105. Write (publicity) news release.

106. Design advertising inserts for mailing.

107. Maintain awareness of competitor's promotional activities.

108. Use last year's advertisements for promotional planning.

109. Explain the importance of cooperative advertising/promotional materials.

110. Develop advertising layouts.

111. Explain the use of color in advertising.

112. Explain the use of brands and trademarks.

113. Explain the use of slogans.

114. Check advertising proofs.

115. Coordinate displays with advertising.

116. Plan/Schedule displays/themes with management.

117. Determine display locations.

118. Develop color scheme for display.

119. Explain the role of (trade shows) exhibits.

120. Evaluate media/advertising effectiveness.

121. Define entrepreneurship.

122. Explain the concept of risk.
(See 017)

123. Identify the major factors contributing to the success of a small business.

124. List the personal qualities and skills needed to be a successful entrepreneur.

125. Assess your own ability to be a successful entrepreneur.

126. Identify the types of and sources for technical assistance needed by the entrepreneur.

127. Identify the components of and complete a business plan.

128. Identify how the business plan helps the entrepreneur.

129. Explain government rules and regulations affecting the individual entrepreneur and summarize their importance.

130. List the advantages and disadvantages of the types of ownership.

131. Select the most appropriate type of ownership for a business.

132. List the costs that must be considered when starting a business.

133. Identify the various sources for obtaining financing for a new business.

134. Select the best location and layout for business.
Science Skill: Understand the importance of using a scientific method as a way of solving many everyday problems.

135. Obtain information on and select equipment, supplies, etc.
Science Skill: Understand the importance of using a scientific method as a way of solving many everyday problems.

136. Explain the role of management in operating a business.

137. Develop company objectives.

138. Establish and interpret general/personnel policies.

139. Interview/Select new employees.(same as competency 076)

140. Select and use the methods of training best suited to individual situations.(same as competency 079)

141. Plan and develop a work force budget and schedule employees.(same as competency 080)

142. Handle employee complaints and grievances.(same as competency 088)

143. Explain ways to build employee morale.(same as competency 086)

144. Conduct staff meetings.(same as competency 084)

145. Prepare merchandising/buying plans.(same as competency 092) (See 091)

146. Select appropriate products.((same as competency 091) (See 091)

147. Develop/Administer a comprehensive, company-wide promotional program.

148. Establish/Evaluate credit policies.

149. Identify types of and use records needed for business operations.

150. Develop protection and emergency plans for a business.

Science Skill:

1. Describe how disease-causing organisms enter the body.
2. Understand the concept of matter.
3. Understand that compounds can be altered to form different and new compounds.
4. Understand that people interact with the environment and produce change.
5. Know that the earth's environment is fragile and easily damaged.
6. Be familiar with the evidence of chemical change.
7. Understand human anatomy and physiology.
8. Understand force and motion.
9. Understand work, energy, and power.
10. Be familiar with physical changes such as phase changes.
11. Understand the concept of heat transfer.
12. Understand electrical energy.

Subcompetency:

1. Describe ways to prevent bacterial contamination in the restroom, kitchen, and other parts of the business.
2. Identify hazardous chemical components of products which may be used in a business.
3. Recognize the potential for contamination and pollution caused by improper use and disposal of various products.
4. Identify hazardous chemical reactions which can occur when certain cleaning products such as bleach and ammonia are combined.
5. Describe the body mechanics recommended for moving large items.
6. Recognize the role of force, balance, and height in the incidence of work related falls and injuries.
7. Relate burns to heat source.
8. Recognize proper insulation as a means of preventing shock and burns.
9. Use knowledge of basic circuitry to identify, prevent, and correct electrical safety hazards.

151. Develop company-wide budget.

MATRIX

SCIENCE COMPETENCY STATEMENTS[1] Demonstrate the ability to:	VOCATIONAL EDUCATION COURSES: Accounting I, II	Office Occupations I, II	Personal/ Family Living Skills	Foods/ Nutrition	Marketing
1. Observe and identify.	•	•	•	•	•
2. Classify.	•	•	•		•
3. Interpret data.	•	•	•		•
4. Formulate models.	•	•			•
5. Predict and infer.	•	•	•	•	•
6. Control variables.	•		•		
7. Use numbers.	•	•	•	•	•
8. Measure accurately and record measurements precisely.	•		•	•	•
9. Communicate effectively.	•	•	•	•	•
10. Transmit observable data.	•	•			•
11. Use and care for instruments and equipment.	•	•	•	•	•
12. Develop a positive attitude toward the use of scientific inquiry as a way of thinking and evaluating all human activity.	•	•	•	•	•
13. Develop a positive attitude toward the contributions of science and technology in shaping the world and helping people meet their responsibility in society.	•	•	•	•	•
14. Accept that uncertainties underlie many of the so-called laws of science.	•	•	•	•	•
15. Understand that machines are devices that assist in doing work.	•	•	•	•	•
16. Understand the implications of humans in their environment.	•		•	•	•
17. Understand that a community is made up of interacting populations.			•		•
18. Understand that life is a chemical process.				•	
19. Understand the human body is composed of various systems with specific structures and functions.	•		•		
20. Understand that all life comes from life.			•		
21. Understand that the basic unit of inheritance is DNA.			•		
22. Understand that people interact with the environment and produce change.	•		•		
23. Understand that all organisms exhibit behaviors.	•		•		•
24. Understand that human beings exhibit a period of growth from infancy to adult.	•		•	•	

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25. Understand that what is normal covers a wide range.			•	•	
26. Understand the implication of social/ethical biology.	•		•	•	•
27. Know that the earth is a closed system in space with limited resources which must be preserved.	•		•	•	•
28. Understand plant and human physiology.	•		•	•	
29. Understand viruses, bacteria, and fungi.	•		•	•	•
30. Show how time zones are determined using the earth's rotation.	•				•
31. Understand the importance of caring for the body through proper nutrition, health and sanitary practices.		•	•	•	•
32. Become aware of various aspects of biochemistry.			•		
33. Understand chemical and physical changes.	•		•	•	
34. Be familiar with factors affecting the rate of a reaction.				•	
35. Understand that fibers can be synthesized.	•		•		•
36. Understand the importance of plastics in our modern society.			•		
37. Understand the concept of gravity, velocity and friction.				•	•
38. Understand the concept of energy.	•		•	•	
39. Understand heat energy.			•	•	
40. Understand how light behaves.	•		•		•
41. Understand that work, energy, and power are related concepts.	•		•		
42. Understand electrical energy can be converted into heat and light.	•			•	
43. Understand that heat can be transferred from one object to another by three processes.				•	
44. Understand that machines are devices that assist in doing work.	•	•	•	•	•
45. Have a basic knowledge of solid state physics.	•			•	
46. Understand the basic electronic circuitry and importance of electronics to our society.	•		•		•

[1]Based on Science Competency Statements listed in Competency Goals and Performance Indicators K-12. Raleigh, N. C.: North Carolina Department of Public Instruction, 1980.

NOTE: The asterisks in the matrix indicate that science competencies have been identified as having potential for being taught or reinforced in the course. Because of the extensive number and variation of wording of science competencies at different levels, statements with the most comprehensive connotation were used in the matrix and no attempt has been made to indicate the emphasis or coverage given a particular science skill.

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BIBLIOGRAPHY OF SCIENCE-RELATED RESOURCE

MATERIALS FOR SELECTED VOCATIONAL COURSES

Science Textbooks

7TH GRADE LIFE SCIENCE

Heimler and Lockard. Focus on Life Science. Charles E. Merrill Publishing, 1977. Examines our biological world of inquiry, concepts and content. Six units: Life, Animals and Plants, Microbes and Disease, Human Biology, Reproduction and Heredity, and Ecology and Human Influence.

Ramsey, Gabriel, McGuirk, Phillips and Watenpaugh. Holt Life Science. Holt, Rinehart and Winston, 1978. Examines the biological functions and organization of the organisms which make up our living world. Uses both scientific processes and content.

Richardson, Harrison, and Sparks. Life Science. Silver Burdett Company, 1979. Uses both content and processes to develop major concepts. Three units: Human Systems, Animals and Plants and The Environment.

Webster, Fichter, Coble and Rice. Life Science. Prentice-Hall, 1980. Uses a blend of content and investigation to examine the biological world around us. Seven units: Diversity of Living Things; Distribution and Interaction of Living Things; The Organism; Matter and Energy and Living Things; Continuity of Living Things; Living Things and the Past; and Living Things and the Future.

Wong, Bernstein, and Shevick. Life Science: Ideas and Investigations in Science (IIS). Prentice-Hall, 1978. Contains 11 nonsequential major ideas: Scientific Method, Characteristics, Cells, Photosynthesis, Respiration, Human Systems, Reproduction, Environment, Adaptation, Relationships and Balance.

9TH GRADE PHYSICAL SCIENCE

Barman, Rusch, Schneiderwent and Hindin. Physcial Science. Silver Burdett Company, 1979. Uses both content and activities to present basic physical and chemical science concepts. Five units: Methods of Science; Nature of Matter; Structure of Matter; Forces, Motion, Energy; and A Changing World. Societal values and attitudes, current energy concerns and the environment are emphasized.

Brandwein, Yasso and Brovey. Energy: A Physical Science. Harcourt Brace Jovanovich, 1980. Uses both content and student involvement in presenting appropriate physical science concepts. Seven units: Energy and Matter, Energy and Change, Energy and Force, Thermal Energy, Electric Energy, Energy of Sound and Energy of Light. Societal and personal values are treated.

Heimler and Price. Focus on Physical Science. Charles E. Merrill Publishing, 1977. Includes units on Measurement and Motion; Properties of Matter; Patterns in Matter; Changes in Matter; Heat; Light, Sound; and Electrical and Nuclear Energy.

Ramsey, Gabriel, McGuirk, Phillips and Watenpaugh. Holt Life Science. Holt, Rinehart and Winston, 1978. Uses activities and content to present introductory chemistry and physics concepts. Four major units: Motion and Energy; Electricity, Magnetism, and Heat; Structure of Matter; and Reactions of Matter. Contains "hands on" activity to help students further understand the physical science concept.

HIGH SCHOOL BIOLOGY

Hickman, Kennedy, Combs and Marble. Biological Science: An Inquiry into Life. Harcourt Brace Jovanovich, 1980. Teaches biology through examining biological systems and their interrelationships. Students are given examples of how science relates to their lives in sections entitled Science at Work. This helps students to further understand biology.

Moorholt and Brandwein. Biology: Patterns in Living Things. Harcourt Brace Jovanovich, 1976. Examines human interaction with the environment.

Otto and Towles. Modern Biology. Holt, Rinehart and Winston, 1977. Uses the traditional sequence of material presentation starting with cell biology and terminating with ecological interrelationships.

Slesnick, Balzer, McCormick, Newton, and Rasmussen. Biology. Scott, Foresman and Company, 1980. Deals with cells and their biological processes from plants to animals and terminates with the ecological relationships which bind all life together.

Wong and Dolmatz. Biology: Ideas and Investigations in Science (IIS). Prentice-Hall, 1976. Uses the inquiry approach. Investigations are divided into five idea units: Inquiry, Evolution, Genetics, Homeostasis, and Bioenergetics. Social issues such as pollution and drug abuse are also examined.

ADVANCED (2ND YEAR) BIOLOGY

Arms and Camp. Biology. Holt, Rinehart, and Winston, 1979. Includes six units: Cells, Information Coding and Transfer, the Diversity of Organisms, Animal Biology, Plant Biology, and Ecology and Evolution.

Volpe, Welch, Johnson, Kennedy, Hickman, Rhines, Combs, and Barnes. Biological Science: Interaction of Experiments and Ideas. Prentice-Hall, 1977. Consists of three units: The Nature of Biological Science, Experiments and Ideas in Biological Investigations, and studies of the Human Environment.

HIGH SCHOOL CHEMISTRY

Cotton, Darlington, and Lynch. Chemistry: An Investigative Approach. Houghton Mifflin, 1980. Uses an experimentally based program that stresses learning through student involvement.

Choppin and Summerlin. Chemistry. Silver Burdett Company, 1978. Uses a non-traditional approach in examining chemistry and its interrelationships. Excursions examine a particular contemporary chemistry topic.

HIGH SCHOOL PHYSICS

Hulsizer and Lazarus. The World of Physics. Addison-Wesley Publishing, 1977. Combines 17 chapters into 5 units: Basic Concepts, The Laws of Motion, Forces in Nature, Properties of Systems, and Wave Motion. Physics as it applies to everyday life is stressed in the material presented.

Williams, Trinklein, and Metcalfe. Modern Physics. Holt, Rinehart, and Winston, 1980. Stresses basic introductory physics concepts and their practical relationships to the world around us.

Activities, Workbooks, Modules

J. Weston Walch, Portland, ME.

Building a Body (Mark Encery). Worksheets which explain the body systems and their components.

Chemical Experiment from Daily Life (Thomas E. McDuffie and Jacqueline Anderson). Workbook involves students in experiments relating directly to their personal lives such as comparing soap and detergent or determining the effectiveness of antacid tablets.

Electricity, Electronics and You (John Scott). Illustrated workbook of hands-on-experiments using simple equipment and ordinary household material to demonstrate physical science laws and phenomena related to everyday life.

Food and Nutrition: An Intermediate Science Unit (David Newton and Hallinger). Kit for slower learners which allows them to test food for nutrients, calories, etc.

Introducing Science (Bruce G. Ford). Workbook which contains discovery lessons on topics such as observing and measuring, energy, heat and temperature, and electricity and magnetism.

Nutrition and You (David Newton). Workbook which introduces fundamental principals and problems using a scientific approach.

Problem Solving Activity Pack (Smith). Lessons on cassettes which help students get actively involved in learning how to recognize and analyze a problem.

Science and Social Issues (David Newton). Workbook designed to develop scientific awareness and reasoning relative to social issues such as population, environmental pollution, food additives and nutrition.

Teaching Science Today (Jill D. Wright). Techniques for teaching science topics such as genetic engineering and food preservation.

Toxic Substances and You (Ruth Fidel). Reproducible exercise sheets containing facts regarding the psychological reasons for substance use and the physical effects of such use.

Understanding Basic Ecological Concepts (Audrey Tomera). Workbook aimed at developing a sound basis for intelligent and positive action in maintaining healthy ecosystems.

Use and Abuse of Alcohol (Kaufman and Loche). Posters which focus on the physiological, emotional and social effects of alcohol consumption.

Values and Biology (Charles H. Butterfield). Sourcebook which explores the implication of development in modern biology such as genetic engineering and use of animals and humans in research.

Vitamins and Minerals (Debra Kaufman). Posters which give information about important vitamins and minerals.

Vocational Studies Center, School of Education, University of Wisconsin-Madison, Madison, WI.

Introduction to Energy (Posthuma and Stuphey). Curriculum material provides instructional units and support materials on such topics as energy models, dilemmas, energy efficiency and conservation.

Nutrition and the Family. Material emphasizes principles of human nutrition in the selection and preparation of food. Includes special diets, trends, customs and attitudes related to foods.

Computer Software

Compurer Aided Instructional Systems, Holly MI.

Human Reproduction. Tests knowledge of reproduction. AP.

The Learning Machine, Kilder, IL.

The Salt Shaker. 1985. Summarizes current knowledge about salt in the diet. AP II series, TRS-80 III and IV.

Opportunities For Learning, Inc., Chatsworth, CA.

Computer Biology. Provides instruction on main topics such as reproduction, excretion and digestion. AP.

Mendelian Genetics. Begins with simple explanation of how traits are inherited and then allows students to observe, explain and predict results. AP.

Population Series. Includes five science simulations which deal with life, growth, interaction, profiles and evolution. AP.

Simple Machines. Reviews the principle and applications of six simple machines. AP

The Scientific Method. Investigates the how and why of the scientific method. AP.

Sunburst Communications, Pleasantville, NY.

Code Quest: Strategies in Problem Solving (Mary Ann Hermann). Sharpens students thinking skills as they try to break a series of secret codes. AP, Atari, TRS-80.

Discover: A Science Experiment (Ed Herstein). Develops ability to form and test hypotheses in a problem solving situation.

The Factory (Marge Kosel and Mike Fish). Challenges students to create geometric products on a simulated assembly line. Develops deductive thinking and integrates skills in discrimination, logic and efficiency. AP, Atari, Commodore and IBM PC.

The Incredible Laboratory (Marge Kosel and Jay Carlson). Allows students to experiment, discover and design to sharpen problem solving skills. AP, Atari and Commodore.

Filmstrips

The Learning Seed, Kilder, IL.

An Eye for Design (Three filmstrips: The Power of Lines and Rhythm, Balance and Proportion and Grouping and Color) 1985. Emphasizes knowledge of lines, proportion and the golden mean and color basics.

Energy management (2 filmstrips). Teaches intelligent energy conservation.

Nutri-Max (2 filmstrips, reproducible) 1985. Emphasizes how to cook for maximum nutrition, nutritional difference among cooking methods, sodium reduction method and how to preserve nutrients in fruits and vegetables.

Salt: Sodium in Daily Diet (Filmstrip and supporting materials). Deals with controversial dietary information related to sodium in the diet.

Taking Care of Yourself (2 filmstrips and supporting material including a research project). Analyzes drug products to determine basic information.

Vitamin Basics (2 filmstrips and supporting material). Reviews chemical names, dangers of megadoses, and natural versus synthetic vitamins.

What Everyone Should Know about Fabrics. 1985. Teaches fiber basics.

What's in the Food? (2 filmstrips and supporting material). Includes information on food additives and food technology.

Sunburst Communications, Pleasantville, NY.

Anatomy and Attitudes: Understanding Sexuality (3 filmstrips). Discusses attitudes toward sexual anatomy and physiology.

For the Sake of Your Heart (3 filmstrips). Explains the structure and function of the heart. Discusses lifestyle and the relation to heart disease.

Genetics: How Life Remakes Life (3 filmstrips). Defines genetic terms and discusses various genetic laws, selective breeding and mutation.

Marijuana Bulletin: A Research Update. Summarizes the results of recent studies of the effects of marijuana on the reproductive system, brain, lungs and behavior.

Nutrition and Exercise (2 filmstrips). Provides information on basic nutritional requirements and discusses the special nutritional needs of athletes.

Nutrition For Teenagers Only (3 filmstrips: Part I - You have Special Needs, Part II - Making Food Decision and Part III - A Healthier You). Reviews special nutritional needs of the teenager including life-styles and physiological and emotional upsets as they relate to nutritional problems.

Nutrition On The Run: Snacks and Fast Foods (3 filmstrips: Part I - "And What Did You Eat Today?", Part II - Fast Foods and Part III - Snack Foods). Encourages young people to question the nutrition quality of food.

The "Innocent" Addictions (2 filmstrips: Part I - Food and Part II - Over-the-Counter Drugs). Exposes hidden dangers in junk food, over-the-counter drugs, diet supplements and other substances that many consider harmless.

The Green Cycle: An Introduction to Photosynthesis (2 filmstrips). Reviews our current knowledge of how plants make food.

What Teens Should Know About Alcohol (filmstrip). Tells what alcohol is and how it works in the body.

ITV and Video Cassettes

Agency for Instructional Television.

Soups to Nuts. Explores contemporary nutrition issues. Ten 15-minutes programs. 7-10 grade.

Terra: Our World. Examines the scientific, aesthetic, social and economic implications of the delicate balance of earth's environment.

Kentucky Educational Television.

Footsteps. Deals with parenting and child development. Thirty 30-minutes programs. 9-12 grade.

Great Plains National ITV Library.

Kinetic Karneval of Jearl Walker. Emphasizes that science does not take place only in the laboratory; it is the way the everyday world works. Six 30-minutes programs.

WHRO Television, Norfolk, VA.

Community of Living Things. Stresses four major topics of change, diversity, interrelationship and energy.